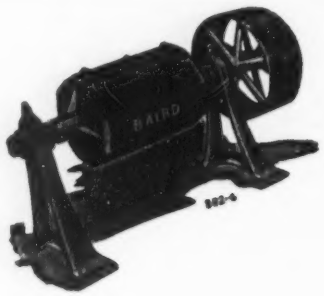
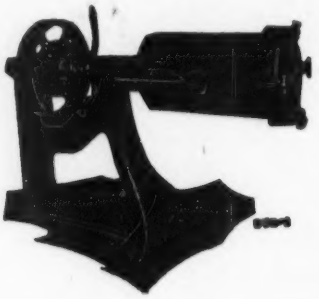
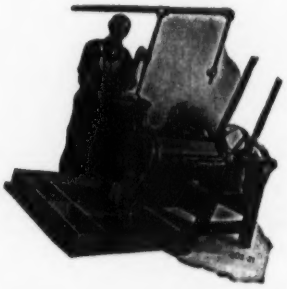
METAL FINISHING

PREPARATION, ELECTROPLATING, COATING

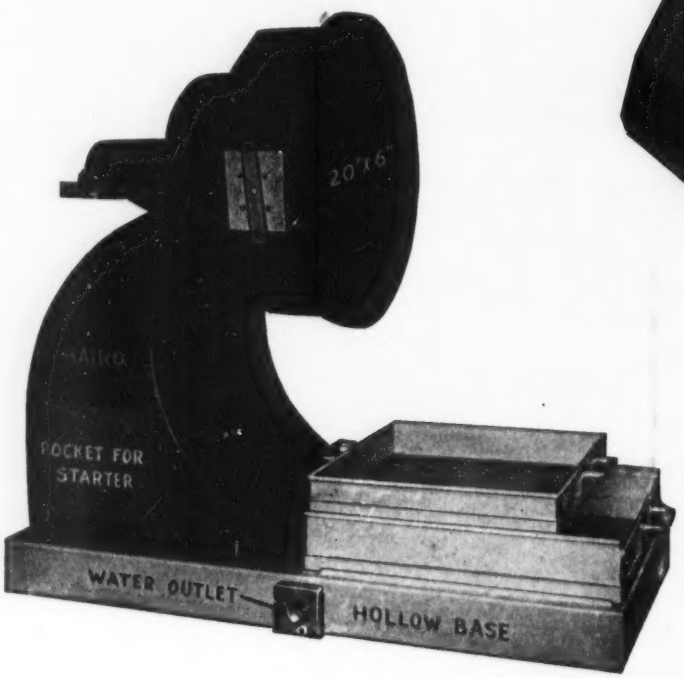
PUBLISHED FOR THIRTY-SEVEN YEARS AS METAL INDUSTRY

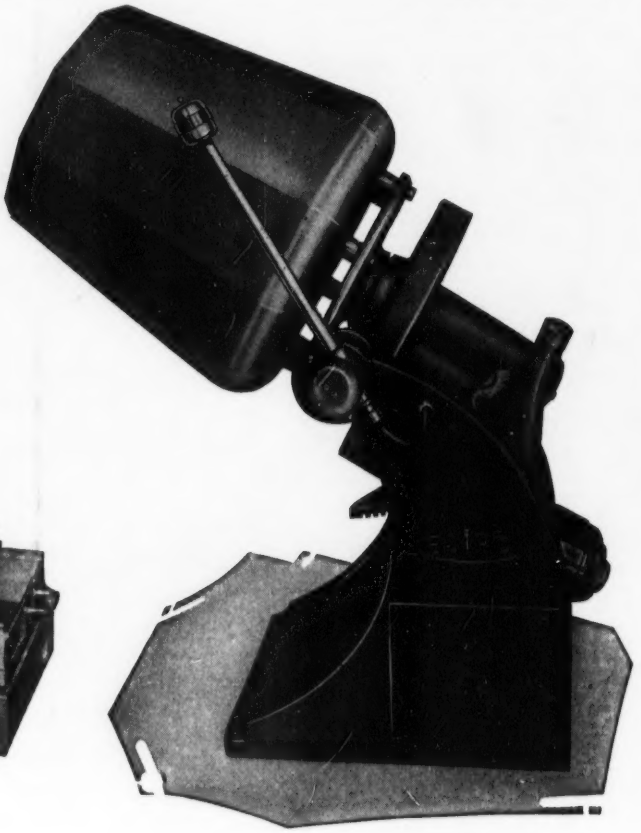






HORIZONTAL BARRELS **TILTING BALL BURNISHING BARRELS**





This shows a High and Narrow Type of Barrel mounted on "Baird" Model D. or Pedestal Type Motor driven Oblique Tilting Tumbler.

As shown the barrel was lined for use for burnishing with hardened steel balls.

These barrels may be of any suitable material depending on the job. Cast iron or fabricated steel unlined or lined with rubber etc. for rolling in abrasives.

Made in 20" dia. x 6" for No. 1 Tumbler
Made in 24" dia. x 8" for No. 2 Tumbler

This shows the side of a No. 1 BAIRD Model D. Single Oblique Tilting Tumbler with a No. 22 Sheet Steel Polygonal Barrel and with an Automatic Electrical Tilting Device.

This device AFFORDS GREATEST SAFETY — LEAST LABOR — LEAST FLOOR SPACE—LEAST AMOUNT OF DISTANCE TO MOVE WORK in USING the tumbling barrels. SAVES TIME AND FLOOR SPACE.

When tumbling questions come up "ASK BAIRD ABOUT IT"

AUTOMATIC MACHINERY BAIRD STRATFORD CONNECTICUT, U.S.A.

THE BAIRD MACHINE COMPANY

STRATFORD 9, CONNECTICUT

Since 1846 specializing in high production machinery for articles of wire and for ribbon metal. Also machines to turn, bore, etc., castings, forgings, etc., up to 10½" diameter.

Here's how Wyandotte bowls over your metal-cleaning problems

A TEN-STRIKE for Wyandotte Products . . . that's the verdict of those in charge of metal cleaning, everywhere!

And why not? Wyandotte has been the established headquarters for up-to-the-minute cleaning products for years . . . just as it's been a recognized source of valuable know-how and technical assistance in metal-cleaning problems.

Speed up is the universal "must" in wartime production, especially in vital metal industries. Wyandotte metal cleaning and degreasing compounds keep pace. They deliver top cleaning results at a minimum of cost.

Whatever your problem, call in the Wyandotte Representative. His rich mine of technical experience and information is ever at hand for you.

Wyandotte

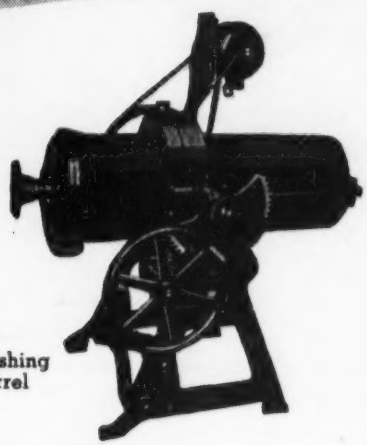
SERVICE REPRESENTATIVES IN 88 CITIES

WYANDOTTE CHEMICALS CORPORATION
J. B. FORD DIVISION • WYANDOTTE, MICHIGAN

• Wyandotte Chemicals Corporation consolidates the resources and facilities of Michigan Alkali Company and The J. B. Ford Company to better serve the nation's war and post-war needs.

Give Your Plating and Finishing Room Problems to a LASALCO ENGINEER

Barrel Plater



Burnishing Barrel

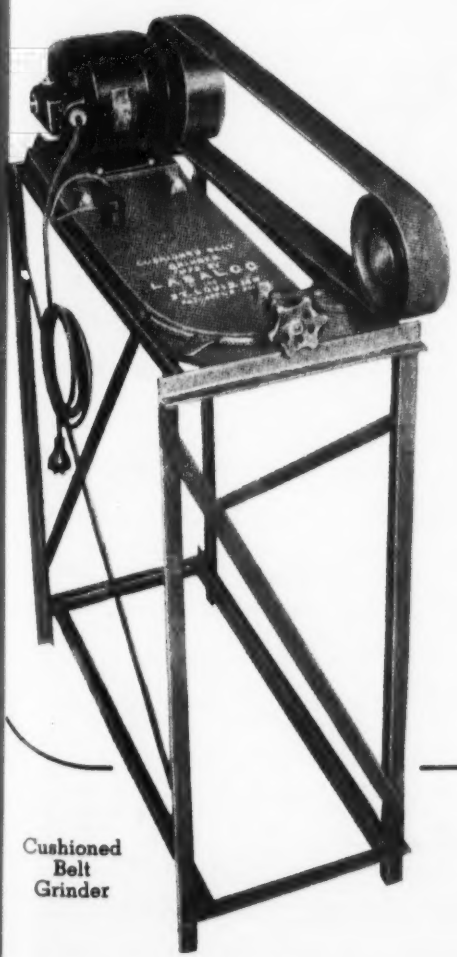
Here is a list of some of the equipment and supplies he has available to give you the *right* solution quickly.

Plating Barrels:
- Utility
- Bull's Eye
- Richards

Burnishing Barrels
Tumbling Barrels
Cushioned Belt Grinders
Electric Sawdust Tumblers
Full Automatic Machines
Semi-Automatic Machines
Hard Chrome Equipment
GE Copper Oxide Rectifiers
Sangamo Amperehour Meters
Chandeysson Generators
Anodizing Equipment
Magnesium Treating Equipment
Descaling Equipment
Blackening Process
"Roto-Finishing" (Deburring)
Special Plating Machines to meet any requirement
Buffs and Polishing Wheels
Tripoli
White Finish
Chrome Composition
Emery Cake
Grease Stick
Stainless Steel Composition
Crocus

Anodes:

Nickel	Cadmium
Copper	Lead
Brass	Gold
Zinc	Silver



Cushioned Belt Grinder

Complete Line of Chemicals and Supplies for Plating

- Nickel Salts
- Chromic Acid
- Sodium Cyanide
- Copper Cyanide
- Zinc Cyanide, etc.

Cadalyte Cadmium Solution
Zin-O-Lyte Zinc Solution
DuPont Hi-Speed Copper
Lea Products
MacDermid Cleaners
Dipping Baskets
Scratch Brushes
Scrub Brushes
Sawdust
Maizo Meal
Copper Wire
Insulating Steam Joints
Rheostats
Test Sets
Plating Racks
Stop-Off Lacquers
Rack Lacquers

Write today for complete information —or ask a Lasalco Engineer to call.

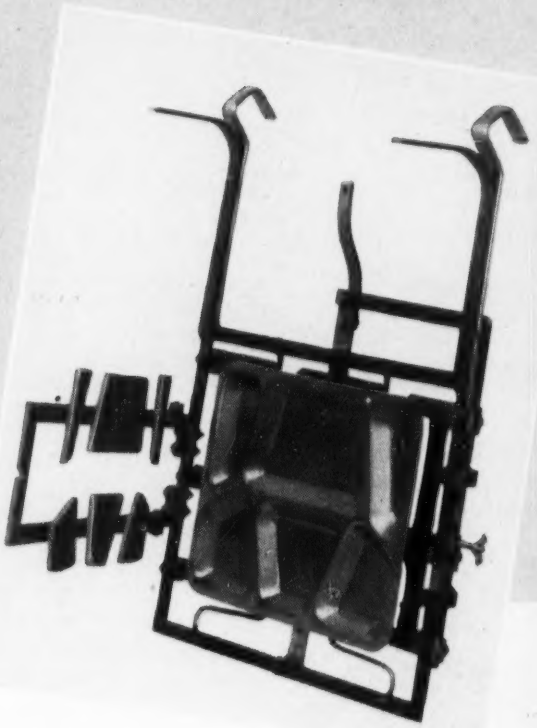
LASALCO, INC.

2818-38 LaSalle St., St. Louis, Mo.

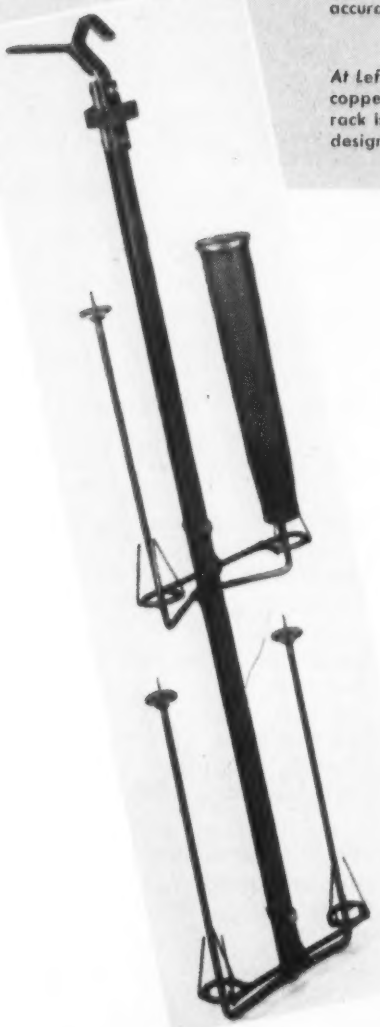
Nankervis

PLATING & ANODIZING RACKS ARE PRACTICAL, ECONOMICAL & DURABLE

At Right. A typical Nankervis plating fixture, designed to do this difficult job, well. Note sturdy construction and accuracy of detail of the fixture.



At Left. A Nankervis rack used in the copper plating of shell casings. This rack is typical of the many specially designed racks from our shops.



THE Nankervis organization is devoted to the development and manufacture of better racks and fixtures for anodizing and electroplating.

Nankervis' staff of designing engineers are specialists. They know the metal finishing rack business from every angle and their experience can easily be the means of saving hundreds of man hours in the metal finishing department of your business.

Nankervis has a complete line of standardized racks for both anodizing and electroplating, carefully engineered and sturdily built for practical everyday use.

If you need new racks or are having trouble with your present ones, send us samples of your parts with dimensional prints of the tanks to be used. Let the Nankervis engineers show you how it should be done.

Patents pending on all anodizing spring contact designs.

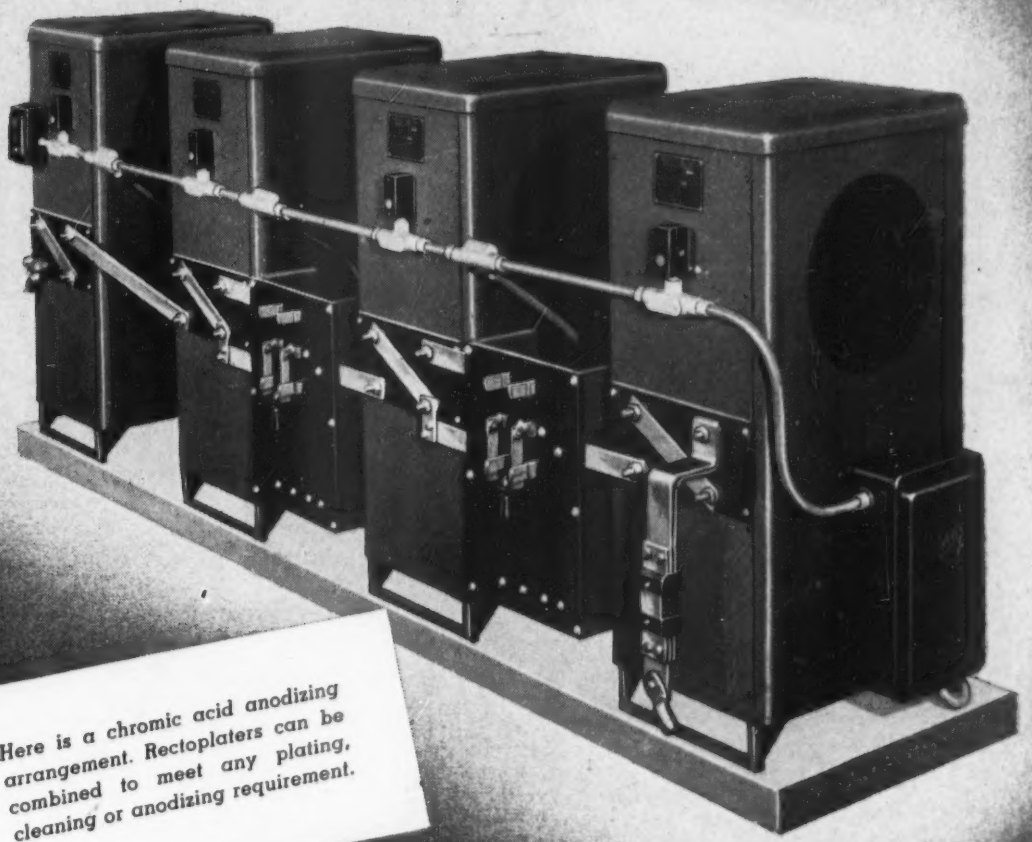
GEORGE L. Nankervis COMPANY

5408 COMMONWEALTH AVENUE • DETROIT 8, MICHIGAN

Mr. Subcontractor:

YOU'LL BE NEEDING EXTRA AMPERES *FAST*

TO MEET INCREASED PRODUCTION DEMANDS!



Here is a chromic acid anodizing arrangement. Rectoplaters can be combined to meet any plating, cleaning or anodizing requirement.

WHEN you are asked to double your output over night. When the walls of your present quarters already bulge from crowding and expansion is impossible. When you can't possibly squeeze in *more* bulky machinery—and you need those extra amperes *FAST*. THAT'S A JOB FOR UDYLITE-MALLORY RECTOPLATERS.

Rectoplaters are small, compact units, standardized in design and production, tested by years of actual service in plants all over the country. Each unit delivers 1440 amps at 6 volts or 720 amps at 12 volts. They are easily moved wherever needed, require little floor space and no special installation.

Rectoplaters may be used individually or in series when greater amperage is required. They require no conversion for peacetime use.

(RECTOPLATERS ARE IN STOCK FOR IMMEDIATE DELIVERY)

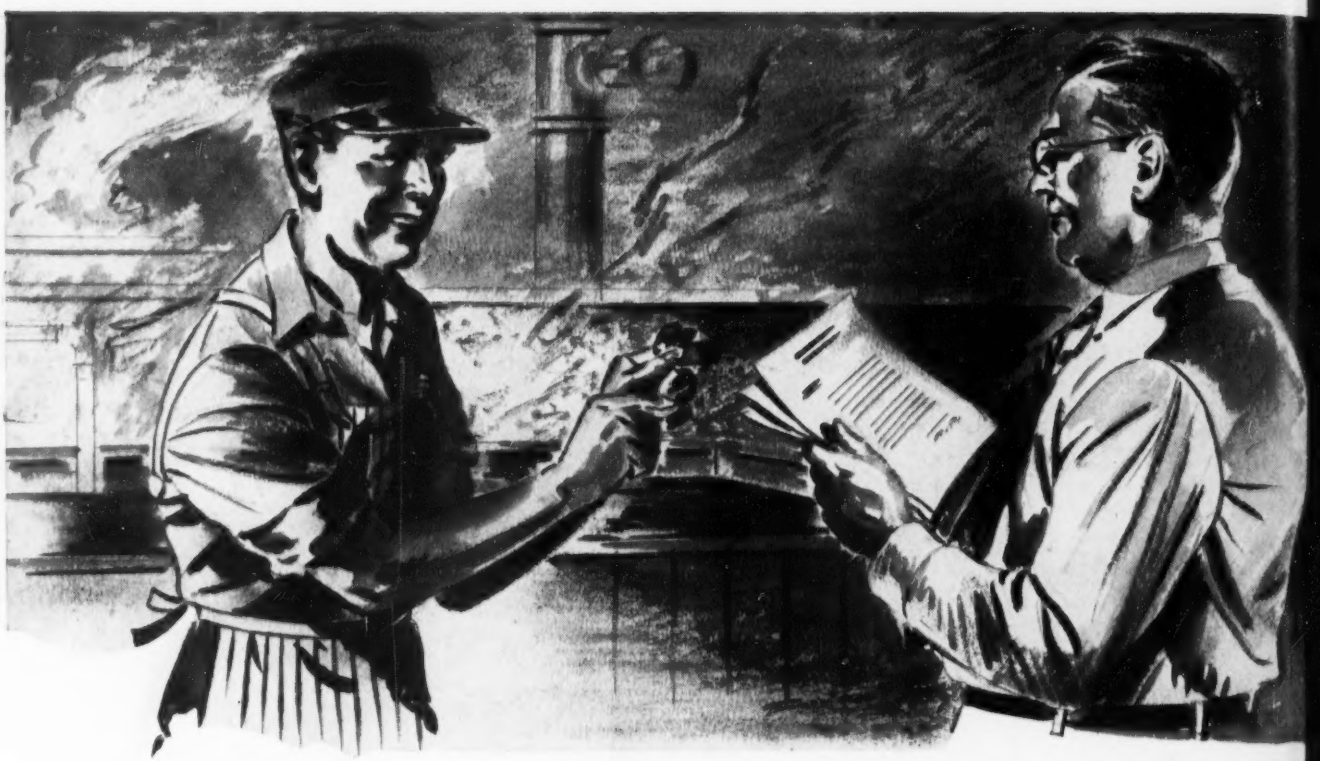
THE UDYLITE CORPORATION

1651 E. Grand Blvd., Detroit 11, Mich.

Chicago 12
1943 Walnut Street

Long Island City 1, N. Y.
11-16 44th Drive

Cleveland 3
4408 Carnegie Ave.



"We Just Can't Get A Good Blac
On These Parts, Jim"

When steel finishing problems arise; when the process that you may be using won't blacken the part uniformly, don't let your finishing man say, "It can't be done." Let Du-Lite help you.

Many times Du-Lite "know how" has pointed the way, and a manufacturer, stuck with a black oxide finishing problem, has carried on successfully. Special heat treated parts, cyanide hardened, frequently cause trouble. We have helped several manufacturers over this pitfall.

It isn't usually necessary to install new equipment. Our engineers make recommendations after studying your problem and inspecting your equipment. If these Du-Lite recommendations are adopted, we guarantee results.

Du-Lite has never been stumped yet. Time and again we have been able to finish satisfactorily steel parts where other processes have failed. If you have a steel finishing problem, write us and our nearest Field Representative will promptly get in touch with you.

DU-LITE CHEMICAL CORP.
MIDDLETOWN, CONNECTICUT

Let's get on with the war

...AND SPEED THE AMMUNITION

with

PENNSALT CLEANERS

Reg. U. S. Pat. Off.

Let's keep hitting the Axis with everything we've got! If you have a metal cleaning operation, let us show you what a Pennsalt Cleaner can accomplish in getting it done in less time—or at less cost—or with more output.

Take this case for example: A well-known steel company was producing 0.30, 0.50 and 0.55 calibre cups for bullet jackets. Involved was a continuous washing, annealing, quenching, pickling and rinsing process. The components were carried through a perforated shell partly submerged in the cleaning solution.

When the Pennsalt serviceman called, he found that the cleaner then in use was only partly effective. Unsaponified oil was burning off in the annealing furnace, creating smoke and soot—and because the perforations in the shell became clogged, there were repeated delays due to cleaning difficulties.

When a fresh solution of Pennsalt Cleaner was used in the tank at one ounce per gallon concentration—*delays and cleaning difficulties stopped at once!*

Let our experienced technicians help you with *your* metal cleaning problems. Actually billions of cartridge cases, shell cases and bullet jackets—as well as great quantities of other ordnance and armament—have been most successfully cleaned with Pennsalt Cleaners.

Consultation involves no obligation. Write fully—Dept. MF.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals

1000 WIDENER BUILDING, PHILADELPHIA 7, PA.

New York • Chicago • St. Louis • Pittsburgh • Minneapolis • Wyandotte • Tacoma

Pure Water FOR PLATING

at a fraction of former costs!

De-ionized water (comparable to distilled water, but at a fraction of its cost) in plating solutions and in pre-rinse tanks eliminates the troubles due to mineral salts in water supply. Ion-exchange resins can also be used to reclaim precious metals now being washed away in solution. Pioneers in the manufacture of De-ionizing equipment, ILLCO has been called on to supply pure water in a number of plating departments and users are enthusiastic about results. . . . Without *heat*, without fuel, ILLCO-WAY De-ionizing units are daily producing pure water to meet exacting industrial and technical standards in leading U. S. plants.

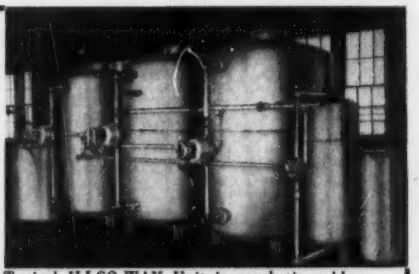
NEW CHEMICAL METHOD REPLACES DISTILLED WATER! This modern, economical method is based on ion-exchange, and uses Amberlite resins. Cost of the treated water is remarkably low—only a few cents per thousand gallons. . . . Learn how ILLCO-WAY equipment can speed production, help cut costs in *your* plant! Write for literature today!

TESTED IN THE LABORATORY • ILLCO-WAY • PROVED IN THE FIELD

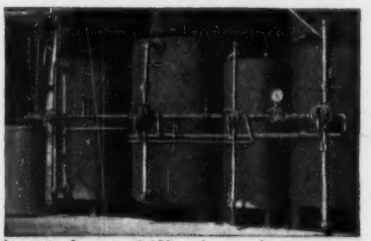
ILLINOIS WATER TREATMENT CO.

Water Treatment Engineers

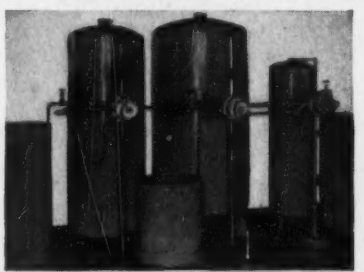
856 CEDAR STREET
ROCKFORD • ILLINOIS



Typical ILLCO-WAY Unit in synthetic rubber plant—4,500 gals. of De-ionized water an hour.

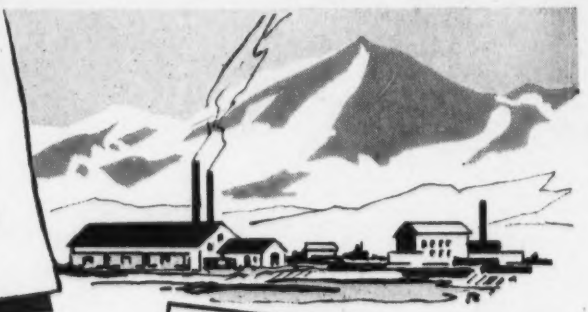


Aircraft factory—3,000 gals. an hour. Other units have permissible flow of from 100 to 50,000 gals. per hr.



Pharmaceutical plant, 1,700 gals. per hr. Similar equipment used for plating and anodizing.

A PUMICE TO MEET EVERY NEED



Not until Valencia — the standard of American Pumice— was discovered at Grants, New Mexico, was it thought that a domestic pumice could match the quality of imported Italian Pumice. This inexhaustible deposit at Grants is true pumice stone and not a volcanic ash. It is physically and chemically equal in every respect to the now unobtainable Italian Pumice. • The Valencia plant's output of grades for every need is rigidly under control for particle size, purity, weight and color.

Check this table comparing Valencia with the highest grade of imported Italian Pumice. See for yourself that Valencia is truly the standard of American Pumice.

	American Pulverized Per Cent	Italian Select Per Cent
Silica	72.90	73.24
Alumina	11.28	10.61
Iron Oxide	.86	1.57
Titanium Oxide	.06	.10
Calcium Oxide	.80	1.10
Magnesium Oxide	.36	.40
Soda	3.64	3.03
Potash	4.38	5.58
Sulphuric Anhydride	.03	.05
Loss on ignition	5.20	4.04

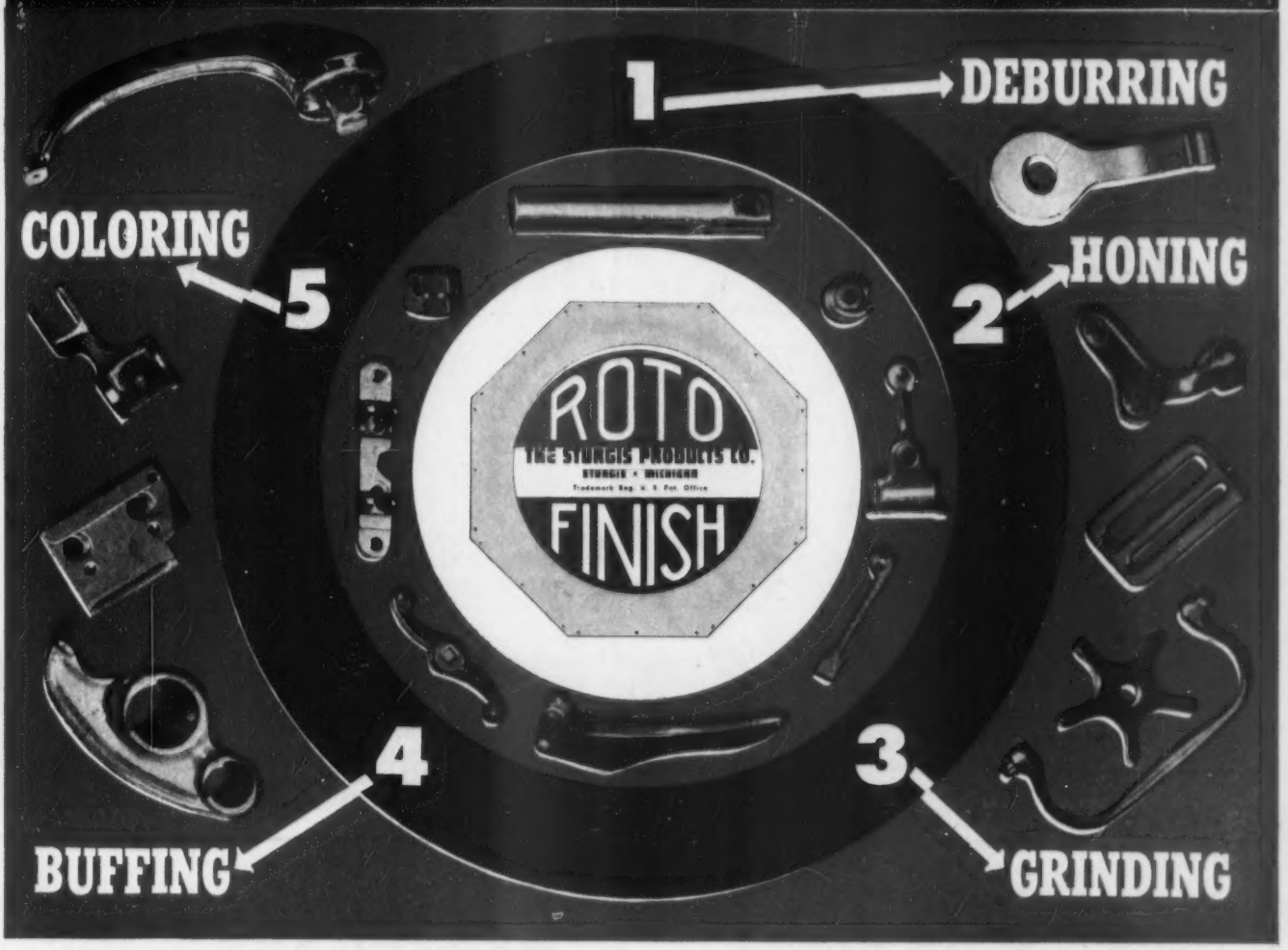
Distributors of
THE PUMICE CORPORATION *of* AMERICA
GRANTS NEW MEXICO

WHITTAKER, CLARK & DANIELS, INC.

260 WEST BROADWAY • NEW YORK CITY

Warehouses: Detroit, Michigan and South Kearny, N. J.

Roto-Finish Embraces 5 Operations for Small Parts



★ All the various sizes and shapes of parts illustrated were processed by a Roto-Finish method. This shows only the range of small parts which Roto-Finish will uniformly and economically process. Large parts weighing up to 75 pounds are being Roto-Finished in defense plants today.

★ This modern, proven method not only removes burrs, fins, tool and die marks, and other surface defects, but it also turns the parts out with a finish which is comparable to the best hand finished operations.

★ Let us demonstrate what Roto-Finish can do to help put your processing of parts on a profitable production basis.

★ Send us a number of your parts. We will Roto-Finish them without cost or obligation to you, returning them with complete data as to equipment and materials used, labor costs, time consumed, etc.

★ Compare Roto-Finish costs with the costs of your present methods.

★ The following list shows the distributors geographically located to best serve your interests:

Wagner Bros., 1249 Holden Ave., Detroit ★ F. B. Stevens, Inc., 510 Third St., Detroit ★ MacDermid, Inc., Waterbury, Conn. ★ Munning & Munning, 202 Emmett St., Newark, N. J. ★ Crown Rheostat & Sup. Co., 1910 Maypole Ave., Chicago ★ Geo. A. Stutz Mfg. Co., 1641 Carroll Ave., Chicago ★ Lasalco, Inc., 2820 La Salle Ave., St. Louis ★ Sommers Bros., 3439 N. Broadway, St. Louis ★ W. M. Fotheringham, 977 Niagara St., Buffalo ★ W. D. Forbes Co., 303 Washington Ave., N., Minneapolis ★ The Reynolds-Robson Sup. Co., 4623 Paul St., Frankford-Philadelphia.

Write for our new folder which fully describes the many advantages of Roto-Finish both in war, and peace-time.

ROTO FINISH

THE STURGIS PRODUCTS CO.

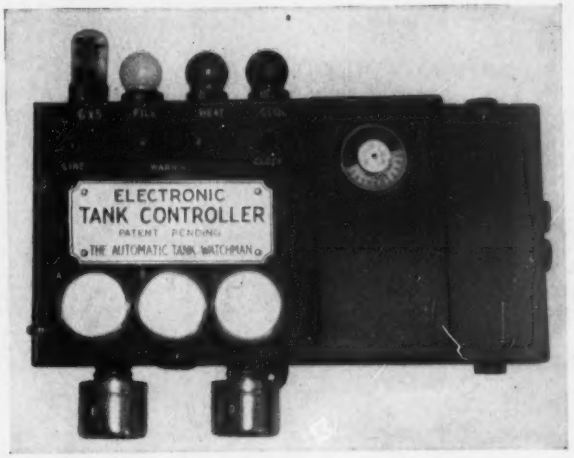
MECHANICAL FINISHING MATERIALS AND EQUIPMENT

PHONE 717 — 203 JACOB STREET — P. O. BOX 511

STURGIS • MICHIGAN

WHY

Buy just a Temperature Control?



When this . . .

Electronic TANK CONTROLLER

"The Automatic Tank Watchman"

—provides leveling—leak detection—overflow warning—and temperature control. All of these and many other features are combined in one instrument which can be obtained at no greater cost than what you would pay for a good temperature control alone.

Install one of these models on your plating tanks and start immediately to save manpower—material and unnecessary waste.

Made in 3 reasonably priced models—Write for booklet giving full details.

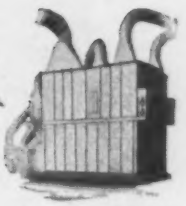
PLATING PROCESSES CORP.
HOLYOKE • MASSACHUSETTS

DUST *and* FUME CONTROL *is a job for...* ENGINEERING *Specialists*

Each unit in a dust or fume control system must be the *right* unit for the particular kind and condition of dust and air present. Selection of the correct, most efficient units—wet, dry, or centrifugal—from the various makes available, is too important for mere hit-or-miss judgment. Like any other complex mechanical project, the planning of a really efficient dust and fume control system is decidedly a job for *engineering specialists.*

For over 36 years, the Kirk & Blum Engineering Staff has specialized in this particular field. First, our Staff makes a thorough analysis of your special dust or fume control problem. Next, the right units for your *job* are selected from among the various makes available. Finally, our Staff *designs* and *installs* a complete system that is *guaranteed* by Kirk & Blum to give the results you want.

Don't risk serious loss of time and money. Don't let guesswork leave you "stuck" with units that are not right for your particular job. Get the unbiased counsel and planning of experts—Kirk & Blum Engineers. For details write THE KIRK & BLUM MANUFACTURING CO., 2859 Spring Grove Avenue, Cincinnati, Ohio.



Clean dry returnable air required. Cloth filter selected.

Wet process air cleaning using Roto-clone.

Centrifugal separator suitable for heavy dust concentration.

Combination of centrifugal separator and dry filter.

KIRK AND BLUM
AN ORGANIZATION OF ENGINEERS AND MECHANICS

DARCO *Stands 24-hour Guard against Plating Solution Saboteurs*

With Darco S-51 on continuous guard duty—grease, oil, soap, decomposition products and colloidal impurities can't get in their underhand work! Darco keeps these "saboteurs" out of plating solution by *adsorbing* them.

Continuous filtration, with Darco, removes even the traces of impurities which ordinary periodic filtration won't eliminate. By catching these unnoticed traces on the internal network surfaces of activated carbon—before they can spread on the plating surface—Darco prevents their causing damage.

Leading plants are using Darco S-51 with entire satisfaction, even with today's heavy schedules. Smaller dosages are effective, because Darco's continuous filtration doesn't allow impurities to build up.

Darco is economical. Ten cents buys enough to keep 100 gallons of solution clean for a week. Be sure you specify Darco.

The article, "Physical Removal of Impurities from Plating Solutions," discusses continuous filtration in detail. Write for a copy.

Current pressure to get work done means overloading the cleaning cycle, causing excessive greases, oils, etc., to be dragged over into the plating tanks. Darco helps meet this situation.

DARCO—Reg. U. S. Pat. Off.

DARCO

This trade-mark identifies the genuine. Accept no packages without it.

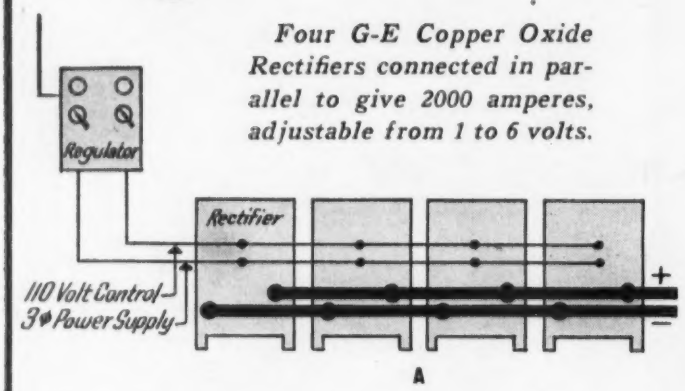
DARCO

CORPORATION

60 East 42nd Street, New York, N. Y.

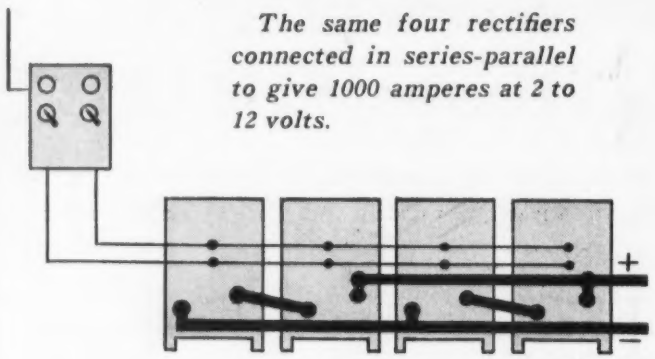
ONE TOOL FOR MANY JOBS

How one electroplater adapted General Electric Copper Oxide Rectifiers for various jobs, including still-tank plating, barrel plating and anodizing



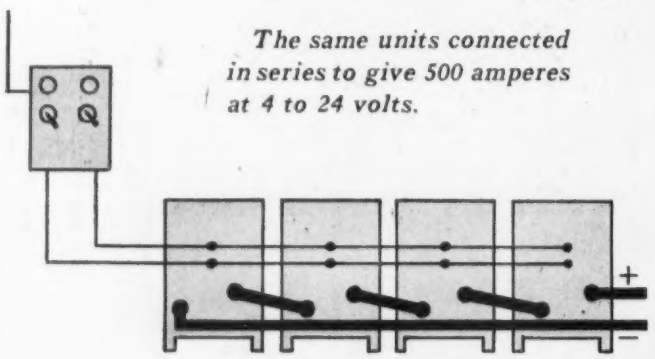
Four G-E Copper Oxide Rectifiers connected in parallel to give 2000 amperes, adjustable from 1 to 6 volts.

A



The same four rectifiers connected in series-parallel to give 1000 amperes at 2 to 12 volts.

B



The same units connected in series to give 500 amperes at 4 to 24 volts.

C

A. 6-VOLT TANK PLATING

By connecting four G-E Copper Oxide Rectifiers in parallel, the plater obtained 2000 amperes at from 1 to 6 volts for a still-tank plating job. The single regulator for the four units gave complete control over the full range output.

B. 12-VOLT BARREL PLATING

When a barrel-plating contract was obtained, it was a simple matter to rearrange the four rectifiers in series-parallel so as to secure 1000 amperes at from 2 to 12 volts required for the job.

C. ANODIZING

The same four rectifiers were also reconnected in series for an anodizing job requiring 500 amperes at 4 to 24 volts.

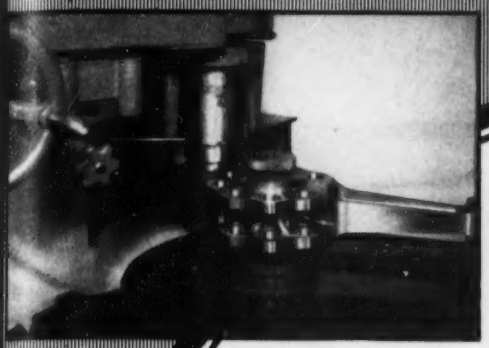
OTHER COMBINATIONS

These are only three common examples of the wide variety of groupings that can be obtained with G-E Copper Oxide Rectifiers to serve specific needs, including 40 volt anodizing.

Why not investigate the potential uses of G-E Copper Oxide Rectifiers in your electroplating? G-E Tungar and Metallic Rectifier engineers will be glad to consult with you. Write to Section A-933-75, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.

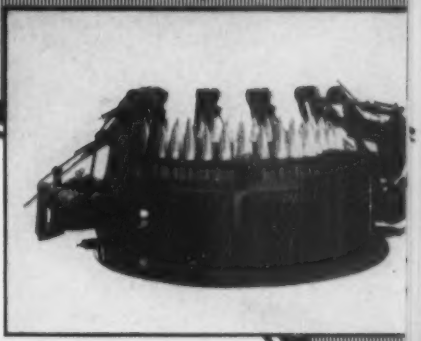
GENERAL ELECTRIC

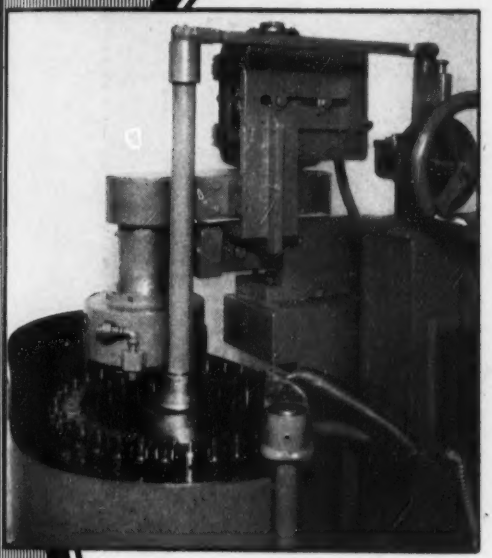
Solving the Man-Power Shortage
in POLISHING..BUFFING..
WIRE BRUSHING..BURRING



Special Acme Machine for polishing engine parts.

Special Acme Machine with 8 belt heads — for polishing tapered cylindrical parts. Multiplies daily production, with greatly reduced man-power.



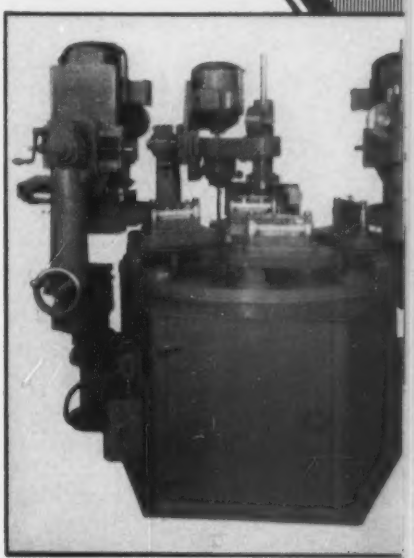


Keep Production Up

BY USING

ACME AUTOMATICS

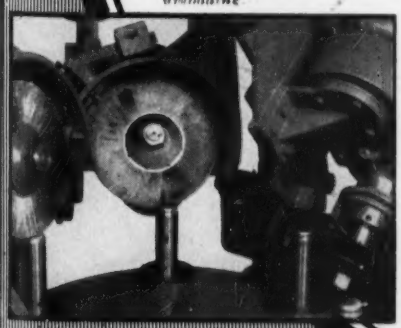
And Spreading Your Man-Power!



Special Acme Machine for grinding small mechanical parts—2000 per hour. Automatic wheel feed. Automatic diamond dresser. Automatic unloading.

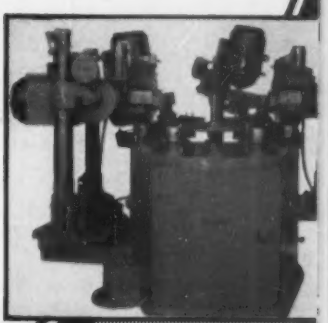
Special Acme Machine for blending the radius in washers—1200 to 1500 operations per hour.

Special Acme Machine for polishing and oiling aircraft parts.



Acme Rotary Machine for polishing, buffing and wire-brushing. Big savings in man hours.

Special Acme Machine for finishing pistons. Constructed to finish valve recess and avoid stuff marks.

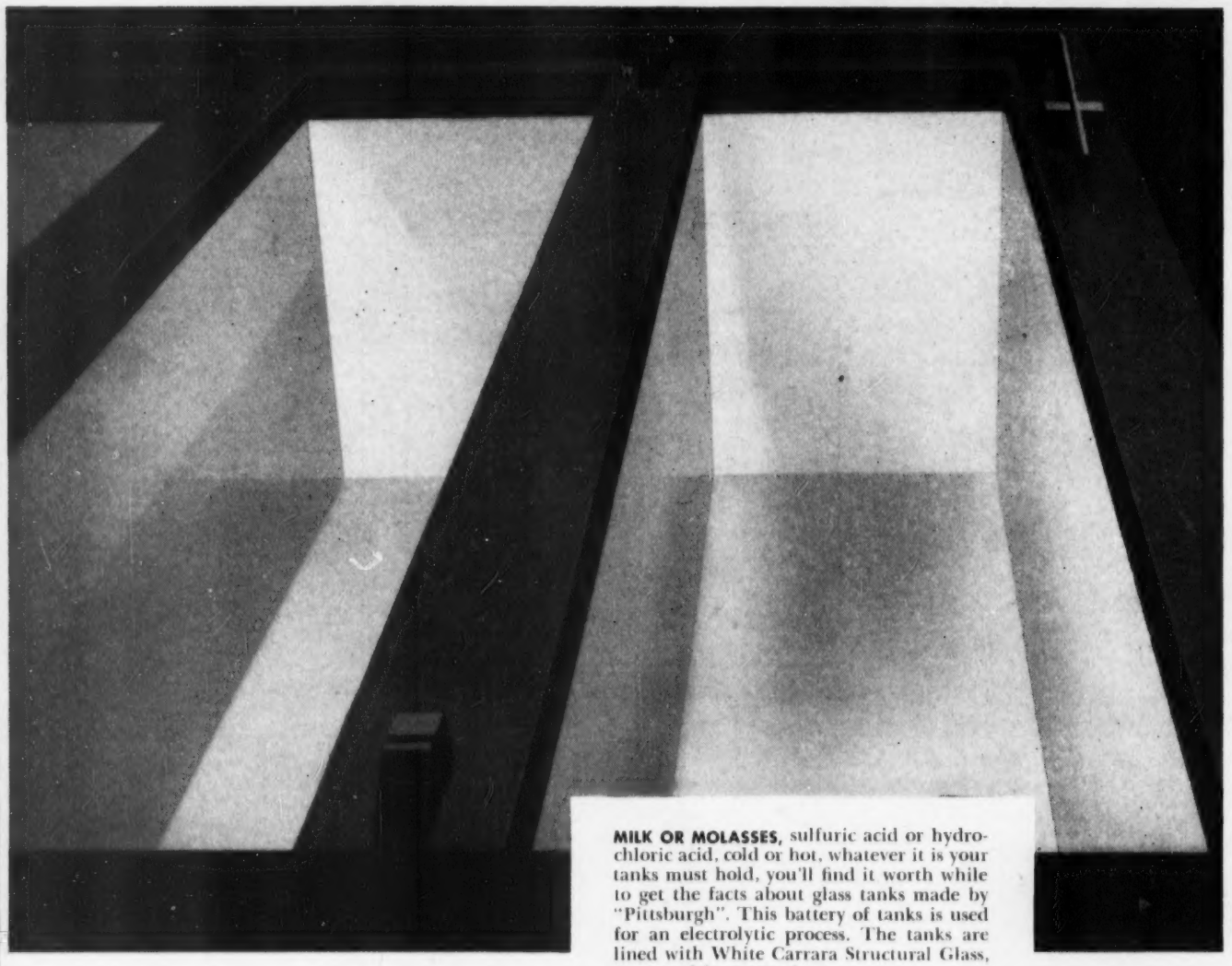


ACME *Manufacturing Co.*

1642 HOWARD ST. • DETROIT, MICH.

Builders OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR OVER 25 YEARS

Glass tanks don't get stomach trouble!



MILK OR MOLASSES, sulfuric acid or hydrochloric acid, cold or hot, whatever it is your tanks must hold, you'll find it worth while to get the facts about glass tanks made by "Pittsburgh". This battery of tanks is used for an electrolytic process. The tanks are lined with White Carrara Structural Glass, tempered for strength.

● THAT'S one reason for the sensational success of the new glass tanks by "Pittsburgh." Acids, alkalis, chemicals, liquids which so frequently cause corrosion, rotting or disintegration of tank linings, simply can't harm the glass "stomachs" of Pittsburgh Tanks. For glass is non-porous, non-absorptive, impervious to practically all liquids.

Furthermore, these new glass tanks are plenty strong to assure long and efficient service despite hard usage. The glass of which they are fabricated is specially tempered for greater strength. And in applications involving electrolytic processes, the glass prevents electric losses.

Glass tanks by "Pittsburgh" come in various styles to suit your needs: either complete, factory-built units with glass linings only, or units faced with glass both inside and out. Tanks of transparent plate glass for certain specialized service. Or "Pittsburgh" workmen can come into your plant and *line* your present tanks with glass.

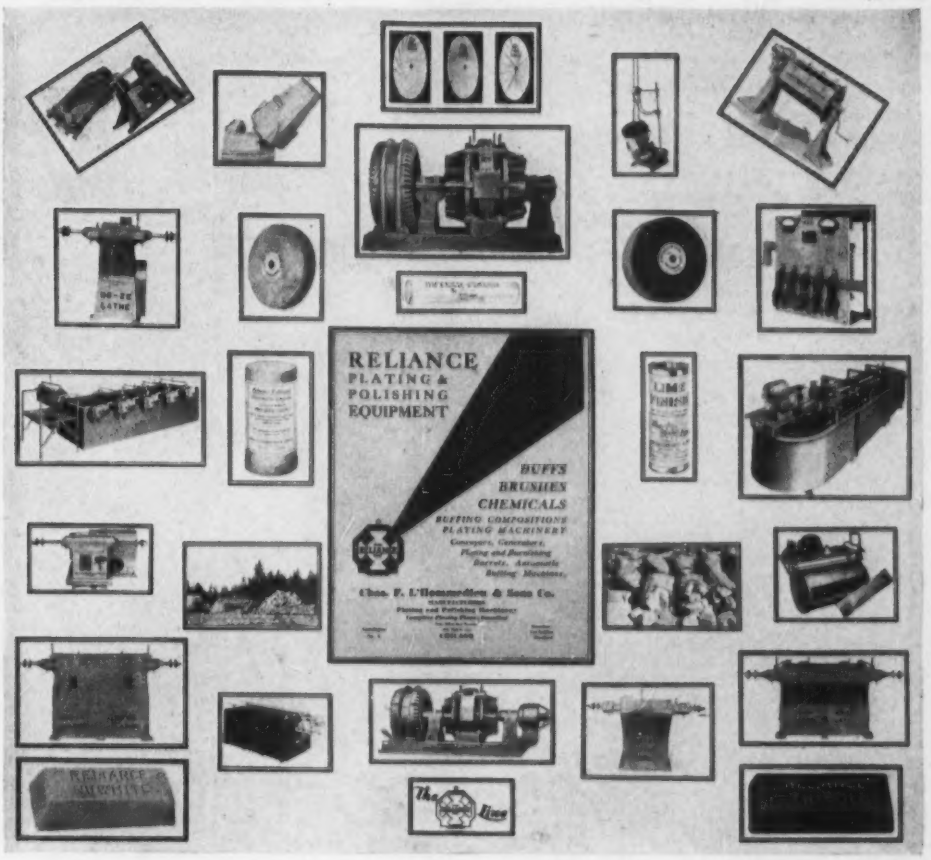
Remember . . . glass is one material that is still promptly available. So Pittsburgh Tanks offer you the unique combination of *better* tanks that you can get *now*.

Write us explaining your requirements. We will gladly work with you on the most satisfactory application of glass tanks to your particular needs. Pittsburgh Plate Glass Company, 2078-3 Grant Building, Pittsburgh, Pennsylvania.

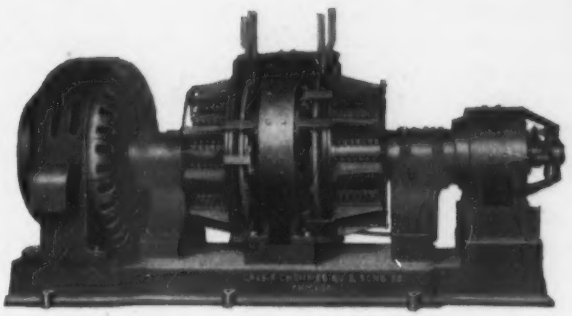
PITTSBURGH PLATE GLASS COMPANY

"PITTSBURGH" stands for Quality Glass and Paint

QUALITY PRODUCTS



EVERYTHING FOR PLATING AND POLISHING



ANODIZING GENERATORS

Chas. F. L'Hommedieu & Sons Co.

Manufacturers of

PLATING AND POLISHING MACHINERY

Complete Plating Plants Installed

General Office and Factory: 4521 Ogden Avenue

CHICAGO

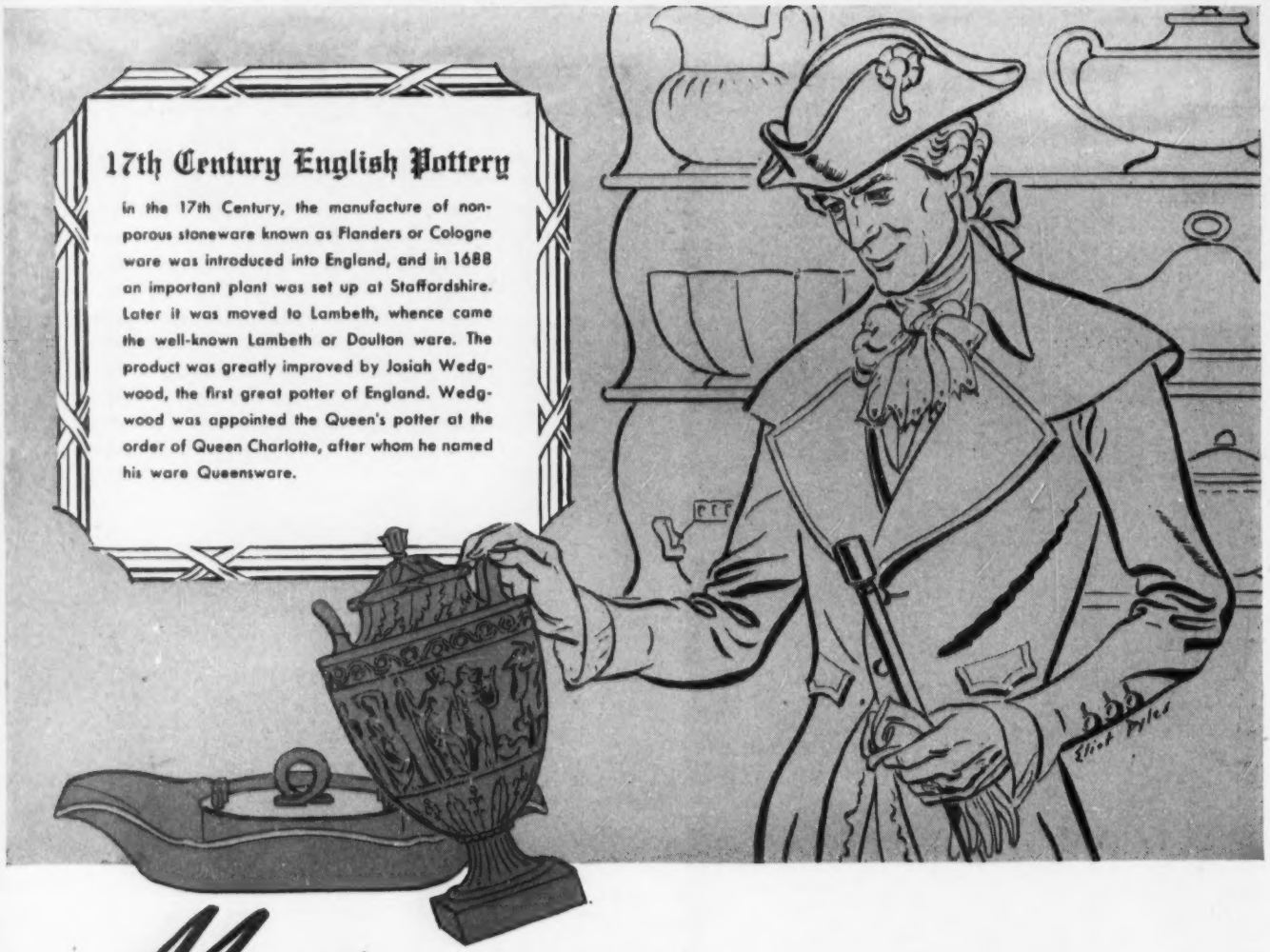
W. R. Shields
Detroit, Mich.

C. B. Little
Newark, N. J.

O. M. Shoe
Philadelphia, Pa.

Branches:
Cleveland and Los Angeles

EVERYTHING IN EQUIPMENT AND SUPPLIES FOR PLATING AND POLISHING



Masterpieces OF POTTERY

THE TREMENDOUS STRIDES made by the chemical industry during recent years have brought increasingly exacting demands on the ceramist for ware to withstand severe mechanical, thermal and chemical requirements.

General Ceramics has met this challenge by developing new ceramic products with unique properties heretofore considered impossible. The tensile strength of General Ceramics Chemical Stoneware has, in recent years, been increased five-fold. A fifty per cent increase has been made in compressive strength. Resistance to fracture has been more than doubled, loss by abrasion decreased by forty per cent, and thermal conductivity trebled. General Ceramics Chemical Stoneware is not merely acid resistant. It is acid proof throughout.

Included in General Ceramics Chemical Stoneware for industrial use are acid-proof pipe, valves, fittings, kettles, jars, pots, pumps, exhausters, coolers, condensers, acid elevators, towers, filtering equipment and tourills.

Other products include Steatite Insulators made by General Ceramics & Steatite Corp., Keasbey, N. J.

FIG. 342
ACID ELEVATOR with DIP PIPE and DETACHABLE FAUCETS

General Ceramics Co.

GENERAL CERAMICS COMPANY
CHEMICAL STONEWARE

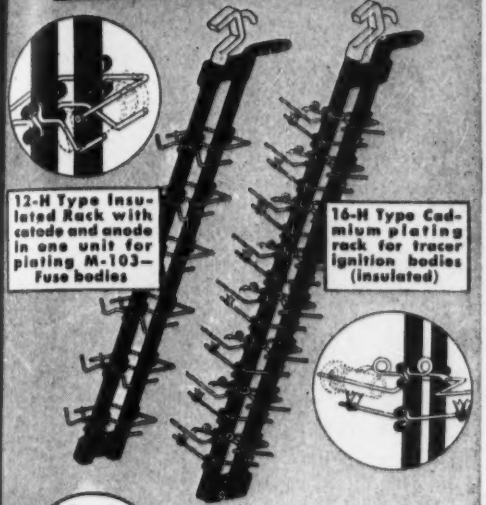
CHEMICAL STONEWARE DIV.
KEASBEY • NEW JERSEY

3957

Insist On Genuine

BELKE PLATING RACKS

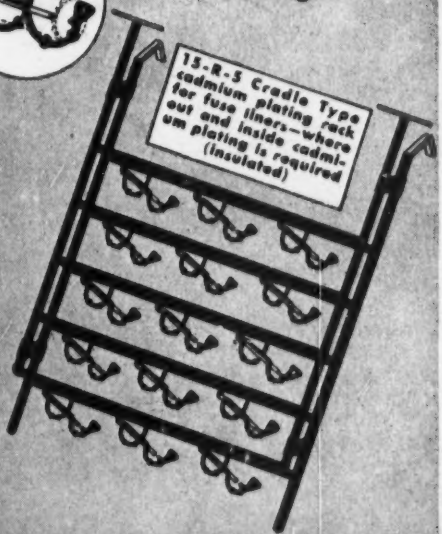
New — Wonderful Synthetic Insulation



12-H Type Insulated Rack with catode and anode in one unit for plating M-103—Fuse bodies

16-H Type Cadmium plating rack for tracer ignition bodies (insulated)

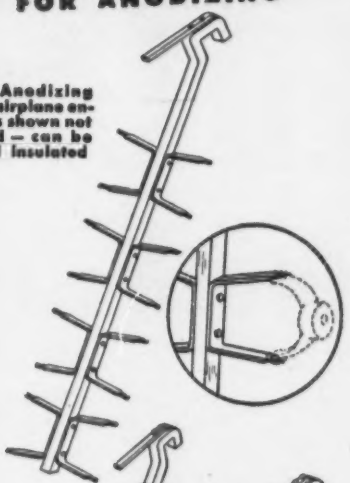
12-R-3-Type rack for plating M-48 Fuse (insulated)



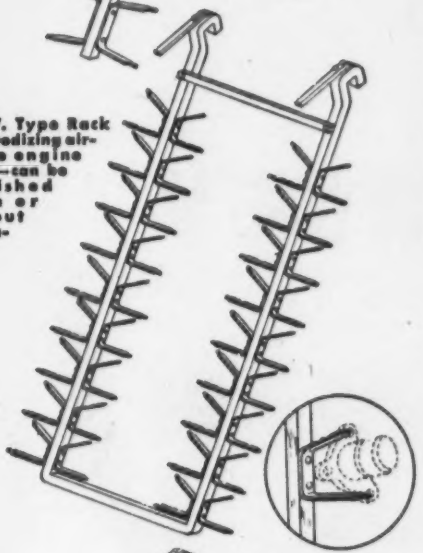
15-R-5 Cradle Type cadmium plating rack for fuse liners—where out and inside cadmium plating is required (insulated)

FOR ANODIZING

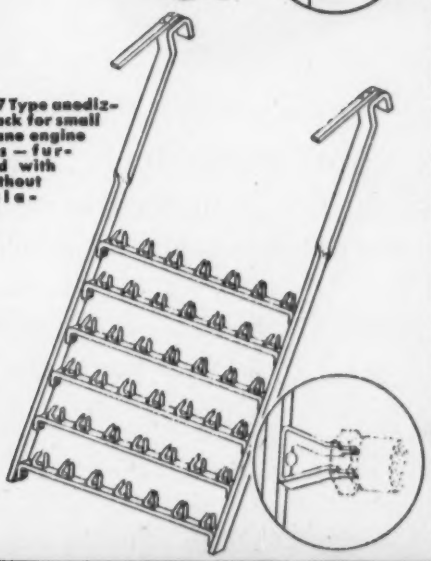
8-H Type Anodizing Rack for airplane engine parts shown not insulated — can be furnished insulated

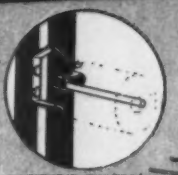


36-LV. Type Rack for anodizing airplane engine parts—can be furnished with or without insulation



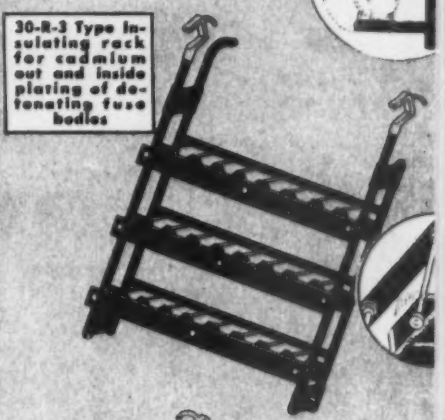
42-R-7 Type anodizing rack for small airplane engine parts — furnished with or without insulation



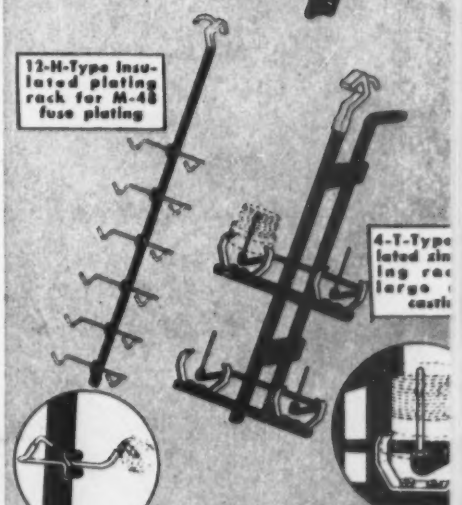


12-H Type rack for cadmium plating M-103 Booster cases (insulated)

8-T-Type Zinc plating rack canteen cups lated)



30-R-3 Type insulating rack for cadmium out and inside plating of detonating fuse bodies



12-H-Type insulated plating rack for M-48 fuse plating

4-T-Type lated zinc ing rack large castl

BELKE MANUFACTURING COMPANY

947 NORTH CICERO AVENUE · CHICAGO

Here's one "help wanted" problem that's easily solved . . . even in these days of man-power shortages. If it's a problem in metal cleaning and working . . . the Diversey D-Man is always on deck to lend a helping hand. Backed by a Research Laboratory that has spent over 18 years developing special purpose products, the Diversey D-Man can often show you ways to step-up production that require *less* man-power. Isn't that the kind of "help" you want these days? Just write to

THE DIVERSEY CORPORATION

53 W. Jackson Blvd., Chicago, Ill.

Preparing aluminum for spot-welding, anodizing, or painting.

Removing drawing compounds, cutting oils, or smut from brass and steel.

Removing scale resulting from heat treatment.

Preparing work for electroplating.

Cleaning steel projectiles.

Cleaning highly finished aircraft motor parts.

Preventing rust before inspection, assembly, or between machining operations.

Drawing, stamping, and forming of aluminum, brass, or steel.

Maintenance cleaning.

DIVERSEY PRODUCTS for Metal Finishing

Aluminum Cleaner—A powerful, yet absolutely safe cleaner for use on all aluminum alloys.

DC No. 1—For safely removing oxide film from aluminum in preparation for spot welding.

DC No. 22—A powerful, heavy duty, alkaline cleaner for iron and steel parts.

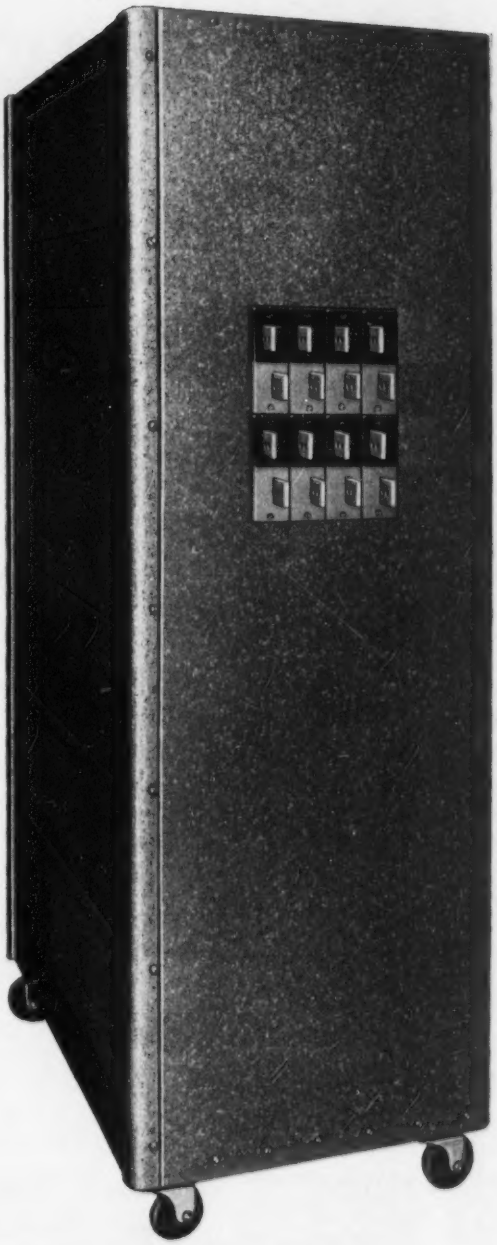
DC No. 12—A modern electro cleaner for use with both direct and reverse current.

DC No. 16—A special solvent and water emulsion cleaner for automatic washing machines . . . prevents rust.

Cutting and Grinding Compound—A quality, soluble oil, resistant to bacteria and hard water salts, for machining and grinding.

DC No. 10—An efficient floor cleaner and maintenance compound; easy on the hands.

GREEN MULTI-PLATER MODEL 86



42" wide, 24" deep
approx. 81" high.

ALL IN ONE CABINET--

the MULTI-PLATER provides eight (8) separate selenium rectifier sections each having an output capacity of 6 volts 500 amperes.

For quick, simple installation and mobility, MULTI-PLATERS are mounted on casters.

Separate output terminals make it possible to connect each rectifier section to a separate tank, or several sections may be added together for higher voltage or greater current capacity, or *all* the sections may be grouped together in a single bank.

When sections are used individually, or in groups, there are *several hundred* possible combinations; for example: If all eight sections are interconnected any one of the following outputs may be obtained:

6 volts 4000 amperes,
or 12 volts 2000 amperes,
or 24 volts 1000 amperes,
or 48 volts 500 amperes.

Standard MULTI-PLATERS provide internal connections for operation from 220, or 440 volt 60 cycle 3 phase supply.

MULTI-PLATERS can be furnished for other supply voltages.

MULTI-PLATERS of lesser capacity than Model 86, as illustrated, are also available.

Write Dept. F for illustrated booklet.

W. GREEN ELECTRIC COMPANY, INC.

GREEN EXCHANGE BLDG., 130 CEDAR ST., NEW YORK 6, N. Y.

RECTIFIER EST. G 1892 ENGINEERS

First in war-as in peace
-for silver plating

Made from virgin metal

•

Not a trace of harmful impurities

•

Always uniform

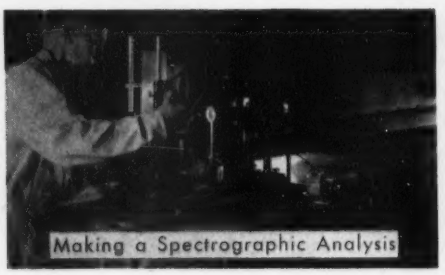
HANDY & HARMAN 999 "PLUS" FINE SILVER ANODES

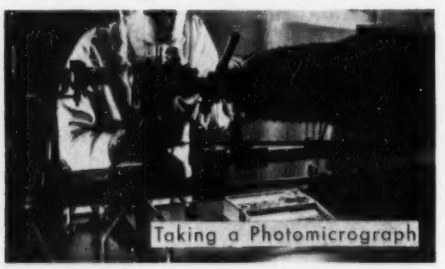
Platers throughout the country who have been using them regularly will understand why Handy & Harman 999 "Plus" Fine Anodes get the call when war production specifications call for silver plating—why, for example, they are chosen to plate the bearings of airplanes which demand the best in fineness and uniformity.

In addition to their many applications in the Arts and their uses on war products requiring a silver coating, Handy & Harman Anodes are also serving the war effort by doing plating formerly done with copper, nickel, chromium and cadmium, thereby releasing quantities of these strategic metals for other work.

Regardless of the nature of the silver plating work you do, you can make sure of an uninterrupted run of the finest plating results by specifying 999 "Plus" Fine Anodes—accept only those with 999 "Plus" Fine stamped on them under the Handy & Harman trade mark.


Exacting Test for Fineness


Making a Spectrographic Analysis


Taking a Photomicrograph

999 "Plus" Fine means (1) much higher fineness in the silver than the standard for ordinary commercial silver; (2) best physical properties for plating; (3) freedom from every trace of impurities that can cause plating troubles. Constant tests guarantee the meeting of these standards in every anode.

ARMY E NAVY

HANDY & HARMAN FOUNDED 1867

HANDY & HARMAN

82 FULTON ST., NEW YORK 7, N. Y.

Bridgeport, Conn. • Chicago, Ill. • Los Angeles, Cal. • Providence, R. I. • Toronto, Canada

Agents in Principal Cities

Faster, safer to operate, easily made up and maintained with prepared salts, the SULFAMATE LEAD solution readily provides smooth, dense, relatively pore-free coatings of from 0.00005″ to 0.0025″ in thickness—at *100% current efficiency!* Simple addition agents are added as needed, and the solution is controlled in the usual way.

Du Pont Sulfamate Lead Plating can be used for production of corrosion-resistant coatings on iron and steel and non-ferrous metals. Typical lead plating applications for industrial purposes include:

Nuts and bolts; substitute for terne plate in linings for gasoline tanks; storage tanks for oil and gasoline; storage battery fittings; linings for chemical apparatus; electrical fittings, cables and hardware for outdoor service; drawing lubricant; engine bearings.

TECHNICAL INFORMATION ***and assistance in specific applications of the Sulfamate Lead Plating process can be obtained from our nearest district office. E. I. du Pont de Nemours & Co. (Inc.), Electroplating Div., Wilmington, Del.***

★ ***BACK THE ATTACK WITH WAR BONDS*** ★

DU PONT
REG. U. S. PAT. OFF.

ELECTROPLATING

CHEMICALS • PROCESSES • SERVICE

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*


US
EQUIPMENT
SINCE 1896
For Plating, Metal Cleaning, Pickling, Acid Dipping, Drying and Allied Operations
FULLY AUTOMATIC SEMI AUTOMATIC
MANUALLY OPERATED
PLATING BARREL APPARATUS
STILL TANK PLATING EQUIPMENT
VARIABLE SPEED PLATING APPARATUS
AUTOMATIC CLEANING & PLATING UNITS
CONTINUOUS ACID TREATMENT EQUIPMENT
MECHANICAL CLEANING APPARATUS
ELECTROLYTIC PROCESSING UNITS
GENERATOR EQUIPMENT
DRYERS, ETC.
U. S. GALVANIZING & PLATING EQUIPMENT CORPORATION
Incorporated 1896
31 Heyward Street, Brooklyn, N. Y., U.S.A.

Founded as METAL INDUSTRY, January, 1903 by
PALMER H. LANGDON
1868-1935

METAL FINISHING

VOLUME 41 SEPTEMBER, 1943 NUMBER 9

Publication Office:
11 West 42nd St.,
New York, 18, N. Y.

PUBLISHED MONTHLY—Copyright 1943 by The Metal Industry Publishing Company, Incorporated, 11 West 42nd St., New York, 18, N. Y. Entered February 25, 1903, at New York, N. Y., as second class matter under Act of Congress, March 3, 1879. Re-entered as second class matter June 13, 1940, at the post office at New York, N. Y., under the Act of March 3, 1879.

SUBSCRIPTION PRICES: United States, $2.00 per year; Canada, $2.50 per year (includes 50c exchange and tax). Foreign $5.00. Single copies 25c. Please remit by check or money order; cash should be registered.

ADVERTISING RATES on application. Forms close the first of the month. Advertising copy should be mailed in time to reach us on or before the 20th of the preceding month.

METAL FINISHING reserves the right to investigate all products offered for advertisement, to refuse advertising considered unsuitable and to edit advertising copy when necessary.

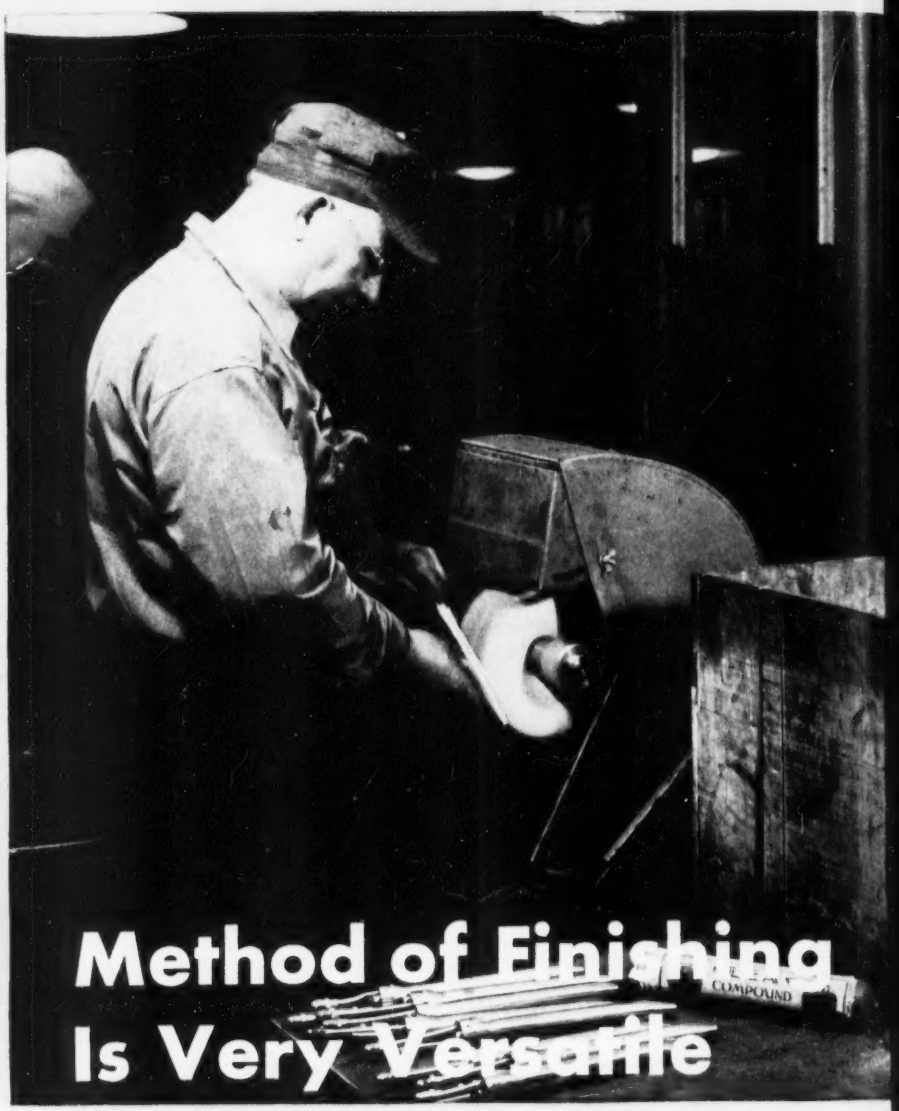
CONTENTS

DEPARTMENTS

At Westinghouse

POLISHING AN AIRCRAFT PITOT TUBE WITH THE HELP OF LEA COMPOUND

To cut down their wind resistance, air speed tubes are given a glossy-smooth finish on a buffing machine by a skilled worker. Attached to wings or fuselages, these metal tubes are part of the speed-indicating equipment which measures air pressure.



The LEA Method of Finishing Is Very Versatile

POLISHING AND BUFFING

It is used for POLISHING and BUFFING aluminum, brass, steel, copper, nickel and other materials; also for removing small fins, file marks, blow-holes, tool or die marks from plastics.

BURRING

The LEA Method is used, too, for BURRING machine gun parts—for BURRING articles with countersunk holes—split gears for aircraft propeller hub assemblies—tappet pins, sleeves and thousands of other metal parts where sharp edges, jagged surfaces and similar burrs must be removed without destroying the surrounding area and without spoiling tolerances.

In burring, LEA Methods and LEA Materials eliminate the need for using hard wheels, hand-sanding, hand-filing, emery cloth and burring tools, thus saving in labor, reducing rejections and maintaining closer precision.

DIFFICULT PROBLEMS SOLVED

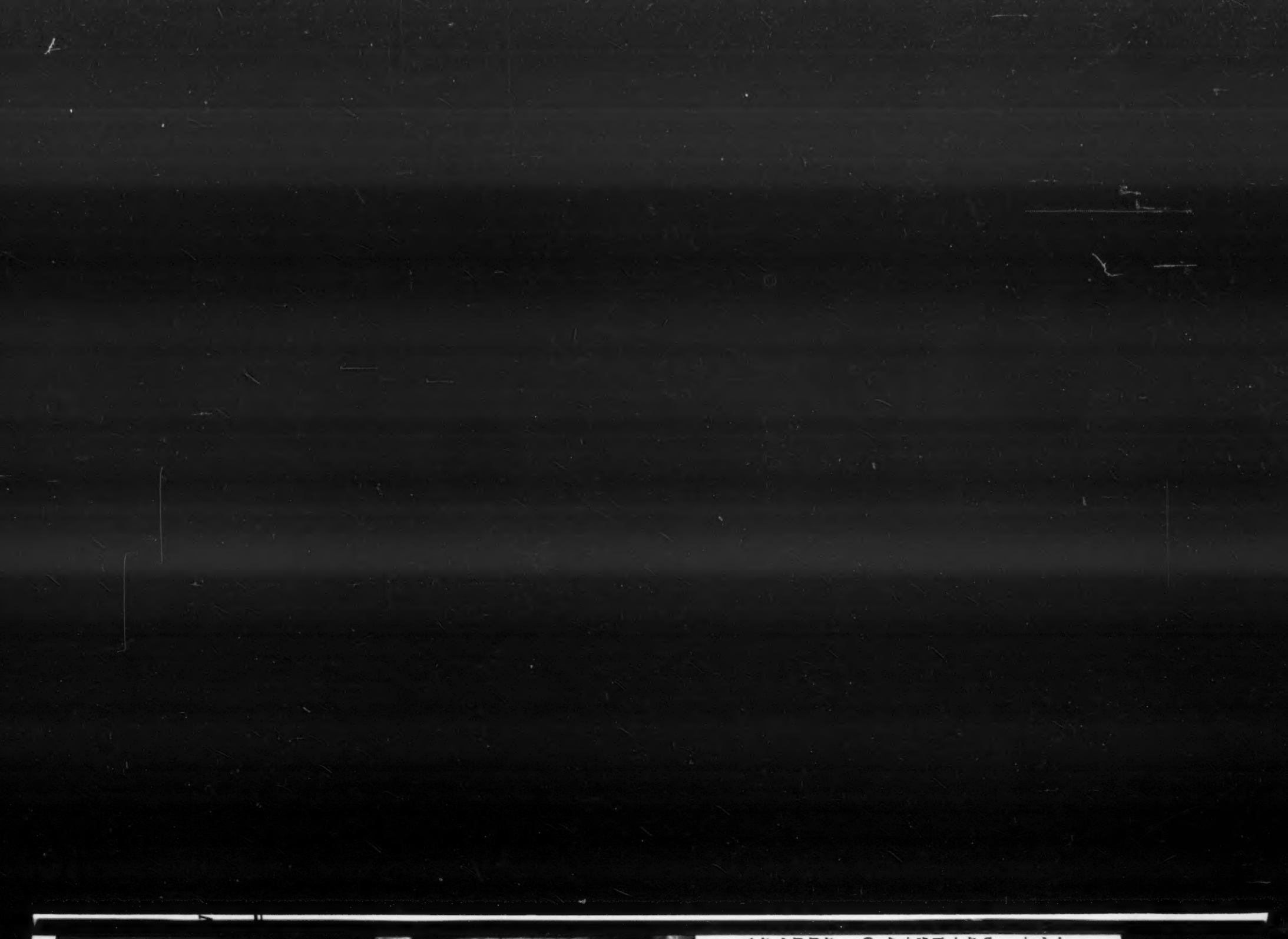
LEA Technicians are successfully solving new and perplexing BURRING, POLISHING and BUFFING problems for many large and small concerns . . . helping each to produce more precise and cleaner parts at lower costs than had been possible through other methods.

If your results are not now satisfactory . . . if your costs seem too high, let us help you solve your problem.

THE LEA MANUFACTURING COMPANY

WATERBURY 86, CONNECTICUT

Burring, Buffing and Polishing » » » Specialists in the Development of Production Methods and Compositions



VOL. 41, NO. 9 METAL FINISHING SEPTEMBER, 1943
PREPARATION, ELECTROPLATING, COATING

SPECIFICATIONS AGAIN

Metal finishers have become accustomed, over a period of years, to plating to specification. Requirements have called for either a minimum thickness of deposit at specified points or an average thickness. Occasionally, specifications have called for a minimum weight of deposit in ounces per square foot of surface.

Tables have been prepared to translate these requirements into terms of amperes and minutes and platers have studied and familiarized themselves with these relationships so that, even in small plants, without routine thickness testing facilities, they are generally able to meet most specifications successfully. It is therefore with a feeling of frustration that we have followed the increasing tendency during the past year for specification writers to call for weights of deposit in *milligrams* per *square inch*.

There is some justification for a specification based on weight of deposit rather than thickness since the former is more readily determined, and, in the case of sacrificial metals like zinc and cadmium, is more pertinent. The protective life of such coatings is a function of their weight and a dense deposit is superior to a spongy one which may be thicker but of less weight per unit of area.

The only excuse offered for this new hybrid specification of milligrams and inches, however, is that laboratory weighings are universally made in the metric system while dimensions are measured in the English system in this country. To which we answer, "So what?" It is our contention that when specifications are drawn up, they should follow the system in use rather than introduce new ones which do not simplify the application in any important respect but on the contrary force the plater to translate the requirements into terms familiar to him.

The use of metric weights in the laboratory does not justify their inclusion in specifications for plating quality if it means additional work on the part of the plater. After all, it is the plater who is called upon to apply the required amount of deposit. The laboratory only verifies it. If conversion from one measuring system to another is necessary because laboratory measuring units are inconsistent, then it should be performed by the laboratory, not by the plater.

Dyeing Chromic Acid Anodized Aluminum
— *Black Finishes* —

By MARC DARRIN and L. G. TUBBS

Mutual Chemical Company of America, New York, N. Y.

Most large producers of war materials fabricated from aluminum and its alloys, are now equipped for chromic acid anodizing. Many are looking forward to the time when this equipment may be employed for the production of colored coatings for post war uses. There are also military purposes requiring colored or black anodic coatings for identification or the reduction of light reflectance. Anodic films are integral with the metal, and at the same time very thin and corrosion resistant. These films ordinarily have a high gloss, but they can be produced with a dull finish. Attractive grain effects also may be obtained. The purpose of this report is to describe how black anodic coatings are produced, and the effect of some variations in anodizing and the character of the alloy.

FOLLOWING the first World War, and almost simultaneously with Bengough's[2] production of anodic films on aluminum in a chromic acid bath, Flick[3] showed that these films could be colored by organic dyes. Because of the empirical voltage cycle and short life of the bath in the Bengough process, this chromic acid process was not used to any great extent. Its use was restricted mainly to aluminum parts of seaplanes subjected to severe salt-water corrosion. For coloring and decorative purposes, other methods of anodizing were considered more practical, and most anodic films for coloring purposes were produced in sulfuric or oxalic acid baths.[11]

Recently, the great need for protection against corrosion of military equipment, especially U. S. Navy aircraft[10], has stimulated investigations resulting in important improvements in the chromic acid anodizing process[7]. By suitable methods of maintaining the proper pH and concentration of the chromic acid bath, important improvements have been made, including economies in material consumption and electrical power, and more uniform coatings have been produced.

Chromic acid anodizing is done in ordinary steel tanks. Current densities are low, no refrigeration is required, and the temperature control is less critical than with other processes. In addition to excellent corrosion resistance, chromic acid films produce little dimensional change, and Hill and Mason[4] have shown that they are far less brittle than other anodic films.

The suitability of the chromic acid process for producing dyed coatings is not generally known. Quite recently, Holman[5], in a comparison of anodizing processes, indicated that chromic acid films were non-absorptive of stains. At the present time, however, attractive and durable black and colored chromic acid anodic films are being produced on aluminum and its alloys. These dyed films are finding numerous uses in the fabrication of aircraft parts and other war implements, and will undoubtedly find still wider application after the war.

Description of Process

During the following general operations, the parts being treated should be properly racked, and not touched by hand, otherwise fingerprints may appear on the finished surface.

(1) Cleaning in a suitable detergent.
(2) Etching, if required.
(3) Anodizing in a chromic acid bath, with subsequent rinsing.
(4) Dyeing, followed by rinsing and drying.

Cleaning:

Any alkaline detergent can be used which removes grease and oil without attacking the aluminum, and which does not leave a deposit on the surface; or, a volatile organic solvent may be employed. The former is more commonly used, but care should be taken to completely rinse off adhering salts or soap before anodizing.

Etching:

When dull finishes are desired, the procedure is to mechanically roughen or etch the metal prior to anodizing. Etching may be done by immersion in a dilute solution of soda ash, caustic soda or nitric acid. Hydrofluoric acid also may be used for etching, particularly with silicon-containing alloys. When soda or caustic are employed the etching should be followed by a water rinse, a dip in concentrated nitric acid for a few seconds and by another water rinse. The concentration, temperature and time of dipping depends on the depth of etch desired, and the aluminum alloy being treated. By way of example, a satisfactory etch may be obtained with aluminum alloy 3-S (1.2% Mn) by immersion in a 5% soda ash solution for five minutes at 125° F., followed by rinsing, a nitric acid dip and a second rinse.

Anodizing:

The intensity of black which a dye bath imparts to a chromic acid anodized surface is roughly proportional to the thickness of the anodic film. Films which are sufficiently thick for corrosion protection, or for a strong bond to the ordinary zinc chromate primer, may not produce a good black. In order to obtain heavy films the anodizing time may be increased, but in general it is more advantageous to increase the anodizing temperature, providing this does not interfere with other operations. The time required to obtain a film suitable for dyeing may be reduced further by lowering the pH of the chromic acid bath. The ordinary concentration of an anodic bath[6] is 50 to 100 g./L. total CrO_3, with the pH maintained at 0.8-0.9. On anodizing for 60 minutes at 40 volts in such a maintained chromic acid bath, films are obtained which are satisfactory for most dyeing purposes. Anodizing longer than 90 to 120 minutes at 125° F. seldom improves the

film, and may cause a powdery or uneven surface. Good racking with firm electrical contacts is essential[8], but the voltage is not critical, nor is the rate at which the work is brought to full voltage.

Dyeing:

Before dyeing all adhering chromic acid should be thoroughly washed from the surface, using cold or tepid water. Boiling water should not be used at this stage as it tends to decrease the absorptive power of the alumina. After washing, the anodized objects may be immersed in the dye bath immediately or allowed to air-dry. Standing for several days after anodizing does not appear to harm the absorptive power of the anodic film, nor is it injured by oven drying for a short time at 160° F.

The dye bath is prepared by dissolving the dye in tap water, and adjusting the pH, if required, with a small amount of acetic acid. Usually Nigrosine JB is employed at a concentration of about 5 g./L., and a pH of 7 to 8. The temperature is about 180° F., and the time of immersion in the dye bath about 30 minutes. After dyeing the work is rinsed in hot water and dried.

Experimental Data

Method:

The data which follow were obtained with specimens which were cleaned in acetone, anodized in a chromic acid bath under conditions specified, rinsed thoroughly in tepid water, allowed to air-dry, immersed in a dye bath containing 5 g./L. Nigrosine JB for 30 minutes at 180° F. at pH 7-8, rinsed in hot water and dried for 20 minutes at 160° F. Baltimore city water was used for all baths. The anodic baths were thermostatically controlled to ± 0.1° F., and provided with adequate mechanical agitation. The anodizing current was obtained from rectifiers, with the voltage manually regulated. Approximately five minutes were allowed to bring to full voltage. The times recorded are for full operating voltage.

Water fastness was tested by boiling for 60 minutes. Mechanical fastness, or dusting, was noted by rubbing with a soft white tissue. Light fastness was determined by the ultraviolet light method[9]. Corrosion resistance was tested by the salt spray method[9].

Effect of Time of Anodizing:

Alclad 24ST[1] panels were anodized for 30, 60, 90, 120, 180, 240 and 990 minutes at 40 volts in a chromic bath at 95° F., and dyed. The same anodic bath was used for all panels in this series of tests. The intensity of the black increased with the anodizing time, for about two hours, as shown in Table I and Figure I. There was no fruther improvement at three hours, and the quality fell off after four hours.

TABLE I

Time Anodized	*Appearance after Dyeing*
30 min.	Transparent gray
60 "	Dark gray
90 "	Gloss black
120 "	Deep gloss black
180 "	Deep gloss black
240 "	Deep black, less gloss
990 "	Dull uneven black

Effect of Anodizing Temperature:

Similar tests were run at the following anodizing temperatures: 95°, 110° and 125° F. The general trend at each temperature was the same, but the films which produced the most intense blacks were obtained in a much shorter time at the higher anodizing temperatures, as shown in Table II and Figure II. Two hours at 110° F., or one hour at 125° F., gave about the same intensity of black as three hours at 95° F. One hour at 110° F., or 30 minutes at 125° F., was equivalent to about 90 minutes at 95° F.

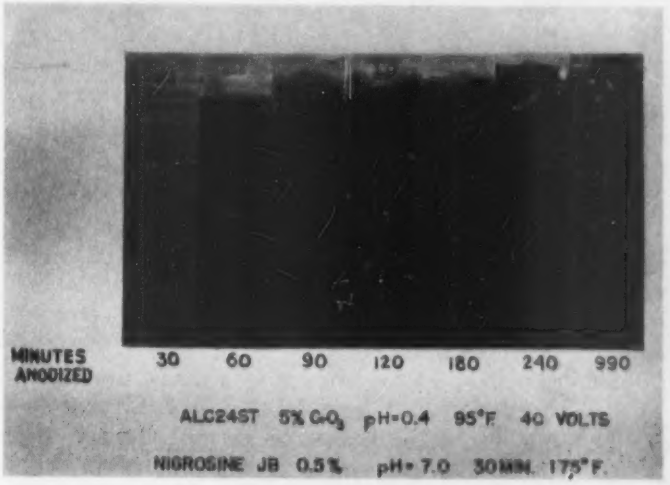


Fig. I. Effect of time of anodizing.

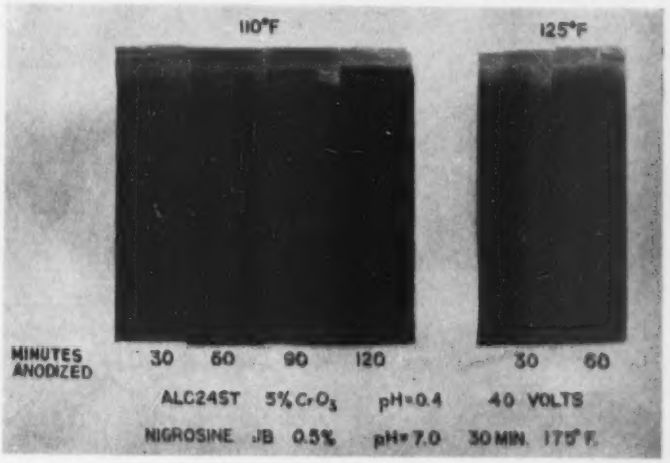


Fig. II. Effect of time and temperature.

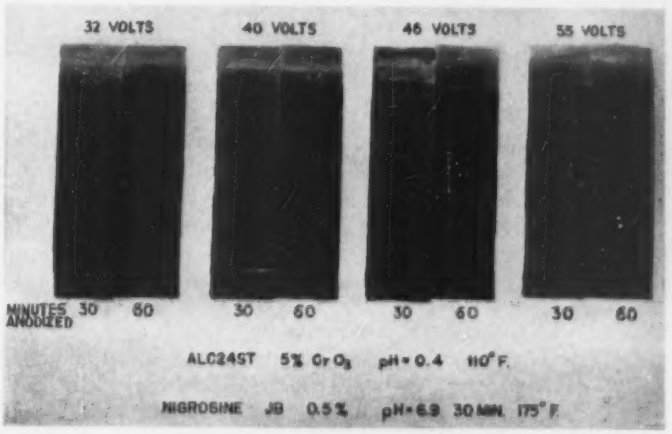


Fig. III. Effect of time and voltage.

TABLE II.

	95° F.	110° F.	125° F.
Light gray	30 min.		
Dark gray	60 "	30 min.	
Fair black	90 "	60 "	30 min.
Good black	120 "	90 "	
Best black	180 "	120 "	60 "

Effect of pH of Anodic Bath:

Specimens of alloy 2S (commercially pure Al[1]) were anodized at 40 volts for 60 minutes at 125° F. in baths containing 95-100 g./L. total CrO_3, but having different pH values, as shown in Table III. After dyeing all were a good jet black; however, the specimens anodized at the lowest pH were a little deeper black than those anodized at a higher pH.

TABLE III.

pH 0.41	Most intense jet black
0.60	Intermediate jet black
0.86	Less intense jet black

Effect of Composition of Anodic Bath:

Similar tests at a fixed pH, but with the concentration of the anodic bath varied from 50 to 110 g./L. total CrO_3, showed no discernible difference in the intensity of the black film. Similar trials with trivalent chromium varying from zero to about 3 g./L. resulted in darker anodic films as the trivalent chromium increased, but no differences could be noted after dyeing.

Effect of Cathode Area:

Varying the cathode area from that of the entire anodizing tank (4.5 sq. ft.), to an iron rod having an area of about two square inches, had no noticeable effect on the final color.

Effect of Anodizing Voltage:

Alclad 24ST panels were anodized in a chromic acid bath at 110° F., for 30-minute and 60-minute periods at the following voltages: 32, 40, 46 and 55. The same anodic bath was used for all panels in this series of tests. After dyeing there was no appreciable difference in the intensity of the black for the same periods of time, throughout this voltage range. However, the black appeared to have a little bluer tone at voltages above 40. No differences were noted between 32 and 40 volts. (See Figure III).

Effect of Variations in Dye Bath:

The concentration and temperature of the dye bath, and the time of immersion in the dye bath, were not critical. Lowering the pH of the dye bath tended to increase a slightly bluish tone in the black produced by Nigrosine JB. If desired, this bluish hue may be masked by the addition of Metanil Yellow, up to 15-20% of the Nigrosine JB. Several other black dyes were tried but with less satisfactory results.

Behavior of Different Alloys

The character of the aluminum alloy and its surface conditions were found to be important. Dyed films on rough anodized surfaces tended to be dull. Most smooth surfaces after anodizing and dyeing, produced excellent jet blacks with a high gloss. Alloys containing silicon usually required a shorter anodizing period, while some copper-bearing alloys produced an interesting grain effect following the rolling lines of the sheet.

Alloys 3S, 24ST and 52S:

Panels of aluminum alloys 3S-1/2H (1.2% Mn), 24ST (4.5% Cu, 0.6% Mn, 1.5% Mg) and 52S-1/4H (2.5% Mg, 0.25% Cr) were anodized for 60 minutes at 40 volts in a chromic acid bath at 125° F., and dyed. All panels were anodized in the same bath, and in an identical manner. After this treatment all of the panels were a good black, but the tone or gloss was quite different for the three alloys. There was a grain effect following the rolling lines on alloys 3S-1/2H and 24ST; but, on alloy 52S-1/4H, the black color was even and deep, with no grain showing.

Before anodizing, one side of each of the above panels was polished on a buffing wheel. The blacks produced on the polished sides of the panels were essentially the same as on the smooth-rolled surfaces, except that there was a little higher gloss and deeper black on the polished sides.

Similar panels were treated in the same way, except that the anodizing period was increased to 90 minutes. Results were essentially the same, except that there was less difference between the black finishes produced on the three alloys.

High-Silicon Die-Castings:

Die-castings made from alloy #13 (12% Si) were difficult to anodize because of high current densities, but fair, dull black finishes were obtained after anodizing for short periods of time (15 minutes), or at lower temperatures (95° F.). Deep matte blacks were obtained with alloy #85 (4% Cu, 5% Si) die-castings by first etching in hydrofluoric acid.

Forgings and Stampings:

Good jet blacks were obtained with stampings and forgings made from alloy 17ST which were anodized for 60 minutes in a chromic acid bath at 125° F. Excellent blacks were obtained in a similar manner with instrument panels stamped from alloy 3S. Deep-drawn parts fabricated from alloy 2S responded to the same process.

Properties of Black Anodic Films

Results obtained with aluminum alloy 17ST panels are shown in Table IV. Similar results were obtained with alloy 2S and Alclad 24ST panels. All panels passed the salt spray test for 250 hours at 95° F. without corrosion, fading or bleeding.

TABLE IV

Appearance	Jet black with a high even gloss.
Mechanical-fastness	Satisfactory.
Light-fastness	Unaffected by 130-hour ultraviolet test.
Water resistance	No bleeding after 60-minute boil.
Corrosion resistance	Passed 250-hour salt spray test.

(*Continued on page* 586)

* Ultraviolet light tests were made by E. T. Johansson of the Young Aniline Works, Baltimore, Md.

The Electrochemistry of Corrosion

By C. L. BULOW

Research Chemist, Bridgeport Brass Co., Bridgeport, Conn.

PART I

CORROSION is not a new problem. We have always been confronted with the fact that metals are not permanently stable. In most environments metals tend to change into some more stable combinations, such as the metallic ores from which they were obtained. Moisture or water accelerates the return of the metal to metallic compounds. It is for this reason that we are generally more concerned with the corrosion of metals called upon to handle naturally occurring waters and industrial solutions or liquors than with metals which are kept in a dry state.

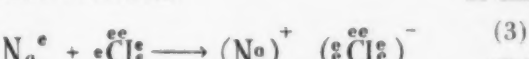
The Electrochemical Theory of Corrosion

During the past fifty years, scientific investigations have produced a tremendous fund of information concerning the behavior of metals and alloys under various conditions of service. Some workers have simply described the appearance of a given metal which was corroding; others have carefully measured the rates at which the corrosion was proceeding under controlled conditions. Out of this maze of information and experimentation came the electrochemical theory of corrosion which has proven very useful and has served to point the way toward the solution of many perplexing problems.

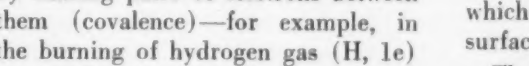
These investigations on the fundamentals of corrosion have indicated that the basic phenomena are the same for all metals and alloys and that they differ only in degree, that is, the rate with which they react or respond to a given environment.

The fundamentals of corrosion are the same as those which are used to describe all chemical reactions, namely the attraction and repulsion between atoms to attain the most stable form under a given set of conditions. According to the modern theory of the atom, its structure is analogous to that of the solar system. The dense, positively charged center of the atom, which corresponds to the sun, is called the nucleus. The nucleus consists of particles of positive electricity (protons) and particles of negative electricity (electrons). Since the nucleus is always positive, there must of necessity be an excess of protons. Around this nucleus are rotating one or more planetary electrons in relatively large circles or ellipses. In a neutral atom in the free and uncombined state (elemental), the number of planetary electrons (—) is equal to the number of excess protons (+). It is the outermost planetary electrons which are involved in all ordinary chemical reactions.

The stable elements have 2, 10, 18, 36, 54, or 86 planetary electrons in their atoms. The atoms of other elements tend to gain or lose electrons in an attempt to conform to the more stable electronic structure. For example, the combining of metallic sodium (11 electrons) with chlorine gas (17 electrons) to give sodium chloride (common table salt) consists of a transfer of one electron (electrovalence) from the sodium atom (Na) to the chlorine atom (Cl) yielding a stable, positively charged sodium atom (Na^+) (now called an ion) and a negatively charged chlorine atom (Cl^-). The atoms in the resulting compound are held together by electrostatic attraction.



The loss of electrons in chemical language is called oxidation, i.e., the sodium has been oxidized. Some atoms attain the stable electronic structure by sharing pairs of electrons between them (covalence)—for example, in the burning of hydrogen gas (H, 1e) in air (O, 8e):



The electrodeposition of metals consists of adding an electron or two to a metallic ion: $M^+ + e \rightarrow M$. The gain of electrons is called reduction, i.e., in this reaction the metallic ion is reduced to the metal.

Chemical Reactions

All metals when placed in water, or a water solution of an acid, base or salt which conducts electricity, have a tendency to dissolve. The rate at which this occurs depends upon the extent of dissociation of the corroding liquid and the activity of the corroding metal.

Water dissociates or breaks up to a very small degree into positively charged hydrogen ions (H^+) and negatively charged hydroxide ions (OH^-):

(1) $H_2O \rightleftharpoons H^+ + OH^-$

Each atom of metal (M) in dissolving forms a positively charged metal ion (M^+) and gives up one or more negatively charged electrons (e). This reaction in the language of the chemist becomes:

(2) $M \rightleftharpoons M^+ + e$

The electrons which are released immediately react with an equivalent number of positively charged atoms of hydrogen (H^+) which form an invisible layer of neutral hydrogen atoms and thus replace the dissolved layer of metal atoms:

(3) $e + H^+ \rightarrow H$

The negatively charged hydroxide ion is attracted to the positively charged metal ion to form the metal hydroxide:

(4) $OH^- + M^+ \rightleftharpoons MOH$

which may also deposit on the metal surface.

The sum of these four reactions is expressed in the following equation:

(5) $M + H_2O \rightarrow MOH + H$

If the metal is left in the water solution long enough, the metallic hydroxide film becomes visible (for example, rust). This intangible displacement reaction (5) is similar to the familiar displacement reaction which occurs when a piece of iron immersed in copper sulfate becomes coated with a thin, visible, red layer of copper instead of the invisible layer of hydrogen:

(6) Metallic Iron + Copper Sulfate → Iron Sulfate + Metallic Copper.

$$Fe + CuSO_4 \rightarrow FeSO_4 + Cu$$

When the more active metals, such as lithium, sodium and potassium are placed in water, the hydrogen formed appears as bubbles of gas rapidly rising from the surface of the metal, instead of as a film of hydrogen according to the following reaction:

(7) 2 Hydrogen Atoms → Molecule of Hydrogen Gas

$$2H \rightarrow H_2$$

In this equation two hydrogen atoms are represented as uniting by sharing electrons (covalence) to form the more stable molecule:

$$H^e + H^e \longrightarrow H^e_e H$$

The less active metals, such as iron, nickel and copper generally produce a thin layer of hydrogen on the metal surface and seldom produce bubbles of hydrogen gas. The formation of this hydrogen film greatly retards the corrosion process and if it is not removed no chemical change or corrosion is apparent. However, if oxygen is supplied, the oxygen will react with the hydrogen to produce water:

(8) 2 Hydrogen Atoms + Oxygen Atom → Molecule of Water.

$$2H + O \rightarrow H_2O$$

The removal of the corrosion product hydrogen by reaction (8) permits the reaction (5) to continue until either the oxygen, or metal is completely consumed.

The rate of the reactions discussed is determined by the slowest of the reactions under a given set of conditions. For example, the reaction $M + H_2O \rightarrow MOH + H$ is the faster and the reaction $2H + O \rightarrow HOH$ is the slowest under many commonly occurring conditions.

Several investigations have shown that the rate of corrosion in natural water is almost directly proportional to the oxygen content. In a closed system such as a hot water heating system in a home, the corrosion becomes negligible after the oxygen has been gradually removed. The rate at which the reaction proceeds also depends upon the character of the metal, hydrogen ion concentration, temperature, etc.

The detection of the corrosion products (metal hydroxide, hydrogen or water) resulting from these reactions varies with the corroding metal or alloy and corrosive solution. The hydroxides of the active metals, for example, sodium and potassium, are very soluble in water and will not reveal their presence for some time. However, when these active metals react with water, the reaction is violent and evolution of hydrogen is very rapid. The hydroxides of the less active metals are only slightly soluble in water and quickly reveal their presence, as, for example, iron rust. The removal of metal ions from the solution by the formation of an insoluble or soluble corrosion product also permits the reaction $M \rightarrow M^+ + e$ to go towards the right. Sometimes other materials present in the water coprecipitate with the slightly soluble hydroxides and form more or less protective coatings on the surface of the metal. A small quantity of dissolved carbon dioxide in water takes part in the formation of a practically insoluble green basic copper carbonate, such as is found in copper piping which has been in service for some time. This film greatly retards the corrosive reaction. On the other hand, a still higher concentration of dissolved carbon dioxide gas (CO_2) in a natural water will dissolve this green basic copper carbonate and consequently accelerate the rate of corrosion of the copper.

In the presence of salts, such as sodium chloride, reaction (5) becomes more complicated:

(9) $M + H_2O + NaCl \rightarrow MCl + NaOH + H$

(10) $MCl + NaOH \rightarrow MOH + NaCl$

(11) $M + HOH \rightarrow MOH + H$

However, these reactions (9 and 10) overlap so that a mixture or compound of metal hydroxide and chloride, called a metal oxychloride, is formed on the metal surface. In this instance, the reaction $2H + O \rightarrow H_2O$, still remains the controlling factor.

The nature and distribution of the corrosion product formed on the metal surface has a tremendous influence on the rate of corrosion. The corrosion product may be a solid, impermeable film or a permeable one with physical and chemical properties which are markedly different from the metal being corroded.

Two Types of Films

The corrosion films which form on metals may be considered as belonging to two classes: the visible, non-protective films and the invisible protective films. It must be remembered that there are numerous films which have characteristics between these two extremes.

It has been observed repeatedly that the visible films, which are insoluble in the corroding medium, usually have the following characteristics:

(1) They are permeable to water. (They permit the flow of a fluid through them.)

(2) They are sufficiently dense to impede the flow of fresh corrosive solution to the metal surface. (This may also slow up the rate of corrosion.)

(3) They are non-uniform or discontinuous, thus permitting the corrosive solution to come in contact with the metal in certain areas and partially screen it in others.

(4) The corrosion may be increased in certain screened areas by the formation of concentration cells.

(5) The metal under the thicker portions of partially permeable film usually becomes pitted (anodic area) or attacked by localized corrosion.

(6) The exposed metal or those areas covered with thinner films are only slightly corroded (cathodic area).

(7) The continued accumulation of corrosion products of the same type helps to produce deeper pits or to enlarge the area being corroded.

The properties of visible corrosion films aid in the formation of the concentration cell type of corrosion. The concentration cell begins to operate when the corroding substance is present in different concentrations at adjacent areas on the metal surface as illustrated in Figure I.

The nature and distribution of sand and slime from various growths, weeds, leaves, silt, ashes, shells, rust, etc., are also very important contributors to cell types of corrosion. It is known

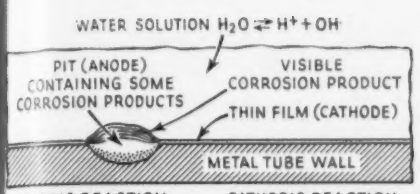


Fig. 1. Concentration cells and reactions.

by power plant engineers that the removal of such debris definitely prolongs the life of condenser tubes. In all instances the metal is corroded (anodic area which is pitted or dezincified in the case of brass) where the oxygen concentration is least. Where no deposit covers the metal (cathodic area) and therefore the oxygen concentration is the highest, since the film is more permeable to oxygen, the hydrogen formed by the reaction $M + HOH \rightarrow MOH + H$ will be readily removed, according to the reaction $2H + O \rightarrow HOH$. This reaction, together with the reaction of metal chloride reacting with sodium hydroxide, yields a metal hydroxide and sodium chloride: $MCl + NaOH \rightarrow MOH + NaCl$. Some laboratory tests have been developed which make it possible to produce almost at will pits or dezincified areas on brass; pieces of cotton or metallic hydroxides placed on brass submerged in sodium chloride solutions will produce such results.

The localizing of the corrosion is due to the fact that differences in electrical potential exist between the various parts of the metal surface where localized corrosion is taking place. Thus corrosion is largely electrolytic or galvanic. The familiar dry cell in our flashlight functions because there is a potential or electrical difference between the zinc and the carbon when they are submerged in the same solution (electrolyte). Continuing this analogy, the anodic zinc pole (negative pole) corresponds to the areas of concentrated corrosion; the cathodic carbon pole (positive pole) corresponds to the slightly corroded areas; the sal ammoniac (NH_4Cl) solution corresponds to the water or salt solutions (weak electrolytes), and the depolarizing or oxidizing agent, manganese dioxide (MnO_2), corresponds to the dissolved oxygen in the water or salt solution. The main reactions involved may also be expressed in terms of the five equations (1 to 5) previously discussed in the section on the electrochemical theory of corrosion.

Thickness of Protective Films

It has been reported that a protective film, prepared by a special process on copper, measuring about 1/10,000,000 of an inch, gives considerable protection against tarnishing. The multicolored films which form on metals heated in air (heat treated steels, etc.) have been measured by a number of different methods and have been found to range from 1/10,000,000 to 1/1,000,000 of an inch in thickness. This is in the same order of thickness as that of oil films on water.

Numerous investigators have worked out ingenious methods for stripping these transparent films (often invisible) from metal surfaces as thin flakes large enough to permit a study of their properties and a determination of their composition. A spectacular experiment which took many months to complete consisted of dissolving away the metal wall of a brass tube leaving only a thin, glossy, iridescent shell composed of the two original tube surfaces.

Protection Given by Thin Films

The properties and compositions of these films have been found to vary with the corrosive environment (conditions of formation) and the metal composition. These film variations in turn control the corrosion rate of the metal in various corrosive media. A commercial application of the use of a semi-protective film is illustrated by the blackish phosphate coating obtained on steel and iron articles when dipped in a hot phosphoric acid-iron phosphate solution. Two such phosphate treatments are known as Parkerizing and Bonderizing. Anodizing of aluminum parts by anodic treatment in chromic acid and other solutions produces a thin protective oxide film which is also in considerable use for increasing the corrosion resistance of aluminum. In addition to giving protection to the underlying metal, these films also serve as a basis for lacquer or paint.

Certain types of films, purposely developed on metallic surfaces, greatly influence the following: (1) the adhesion of rubber, lacquer, oil films, and electroplated coatings to metals; (2) the resistance of condenser tube alloys (aluminum brass and aluminum bronze) to impingement corrosion; (3) resistance to atmospheric corrosion, and (4) resistance to corrosion by liquids and gases of all kinds. As more is learned about the nature of these films, many other practical commercial applications will result.

Removal of Oxygen to Decelerate Corrosion

When it was learned that oxygen generally accelerated corrosion, numerous devices were invented in an effort to reduce the influence of this corrosion rate factor. Some of these devices have been very successfully applied. One such method (applicable to closed systems) consists of passing the water over scrap iron which removes the dissolved oxygen according to the reactions just discussed. Theoretically, if the reaction is controlled by the hydrogen-oxidation reaction (8) the oxygen-free water should circulate indefinitely without any corrosive action. Another chemical method which has been economically used for years for the removal of the last traces of oxygen from boiler water consists of adding a slight excess of sodium sulfite. The sodium sulfite reacts rapidly with the dissolved oxygen to form sodium sulfate:

$$2Na_2SO_3 + O_2 \rightarrow 2Na_2SO_4$$

A mechanical method for removing oxygen and other gases from water consists of raising the temperature and lowering the pressure so that the gas is liberated (all gases are less soluble in water with increasing temperature and decreasing pressure). However, in this instance, sufficient time must be allowed for the separation of the gases from the water. The apparatus required is also more complicated when this method is used. These deaerators operating by this mechanical method have been extensively used on a large scale for many years in power plants, etc.

Removal of Debris, etc., to Decelerate Corrosion

In addition to removing oxygen to decelerate corrosion, numerous other devices have been designed, built and put into practical use to remove debris and undesirable substances from corrosive waters. The simplest device is the screen which is quite effective within certain limits. More complicate units consist of mineral beds or packed towers through which the water is passed. The layers or columns of mineral or other material may remove calcium, dissolved or precipitated iron, sediment, carbon dioxide, oxygen, etc.

(To be concluded next month)

Keeping Dust Under Control

By JOHN M. KANE

Engineer, American Air Filter Company, Inc., Louisville, Ky.

IN RECENT years the safety engineer's responsibilities have increased by leaps and bounds. Under his widening responsibility, logically comes the checking of exhaust systems for the control of hazardous dusts and fumes.

This article will assume that such hazards are evaluated by the industrial hygienist or safety engineer. Where exhaust ventilation is required, the ventilation engineer makes recommendations for exhaust capacities, system and hood design to control the condition.

It will be further assumed that this coordination results in an effective exhaust system removing the dust or fumes at the points of generation and preventing their dispersion to the workroom. Consequently, unless the process is changed, the hoods or enclosures altered, or the method of materials handling revised, the hazard should remain controlled as long as the exhaust system functions *properly*.

The word "properly" can rightly be italicized because in many cases little attention is given to such an installation after the project has been completed. Yet mechanical exhaust equipment and dust collectors require the same attention that machine tool and other plant equipment require and usually receive.

The tools required under most cases for a routine check on the performance of an exhaust system are a manometer (U-gage), and a short piece of rubber tubing. The engineer should also have an understanding of static pressure losses and hood suction.

While hood suction readings have rightfully fallen into a state of ill repute as a means of measuring air flow, they do offer a quick and accurate method of measuring relative air flow. If the hood suction is known while an exhaust system is functioning properly, its continued effectiveness can be assured as long as the hood suction does not reduce from its original value. An expansion of this statement should indicate why this simple measurement can be used as a ready check.

Exhaust ventilation is by far the most popular means of controlling dust hazards. The fundamental elements and the design are not altered, whether the purpose of the exhaust system is to remove toxic or explosive particles, or simply to prevent dispersion for reduction in workman fatigue, improvement of visibility or general betterment of working conditions.

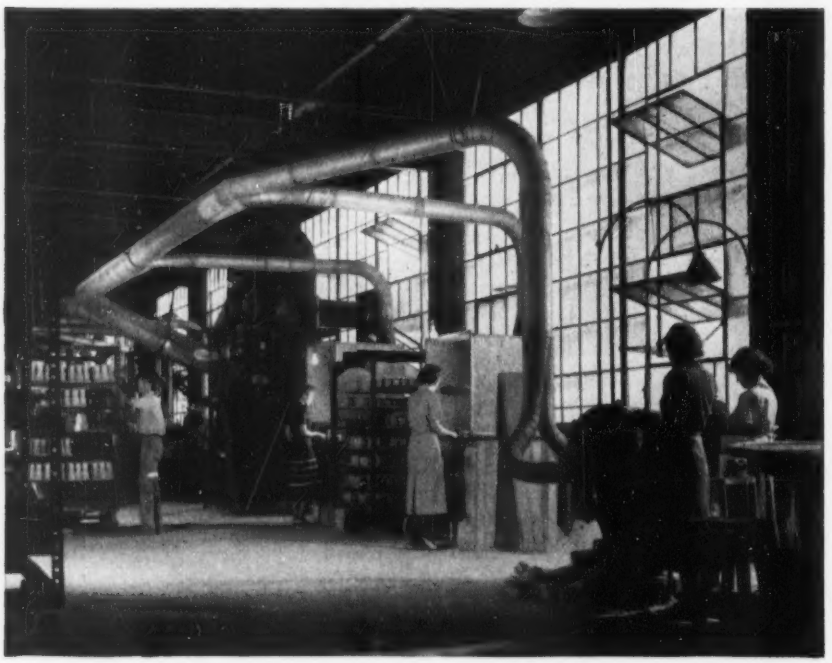
The Exhaust System

In most cases the system will include hoods or enclosures that surround dust-producing areas as completely as possible and as close to the source of dust generation as feasible. Also included are branch ducts connected to the hood so an indraft of air can be maintained through the necessary hood openings —the velocity of the incoming air being sufficiently high to prevent material flying outward. These velocities vary from 50 to 100 fpm for fumes and fine dusts, and to 2,000 fpm for large particles forcefully thrown toward openings in the enclosure.

The size of the duct connection is determined by the cubic feet of air to be exhausted and the velocity necessary to prevent settling in the ducts. Such velocities vary from 1,000 fpm for fumes to 5,000 fpm for heavy loads of coarse material.

Note that velocities have been gaged by smallness of particles and method of generation. Dust and fume particles are too small and have too great surface area to be influenced greatly by the specific gravity of the material. The same velocities are generally used to confine or convey the same size particle of wood or steel.

An exhauster is the usual air-moving equipment that maintains the flow of air through hood and branches. It must have sufficient capacity to maintain the indraft at the hoods, and develop enough pressure to move that volume, overcoming the resistance to flow of air from inertia, turbulence, duct resistance and collector loss. A dust collector removes the entrained material from the exhaust system, con-



Elements of an exhaust system are illustrated by this typical system in an insulator finishing department.

(*Presented to 31st National Safety Congress, October 28, 1942*)

centrating the material for disposal, and preventing its reentry to the workroom.

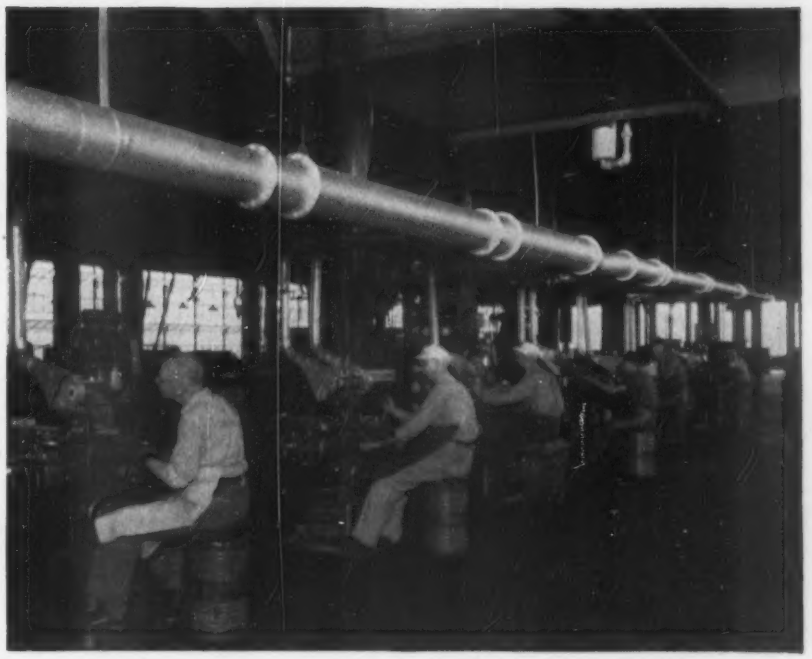
Definition of Hood Suction

In a branch duct close to the hood, a static pressure reading is called the hood suction. It is a measure of the pressure required to induce air flow at the required velocity in the branch (velocity pressure) plus the pressure lost in overcoming the resistance to air flow offered by the hood (entrance or acceleration loss).

Hood suction therefore is a function of the velocity of the air in the branch duct and the ease of getting that volume of air into the duct. (Effective dust control however, is a function of the indraft velocity at the hood and not a function of the hood suction except that velocities in the branch must be sufficient to convey the material without settling and obstructing the air flow by such accumulations.)

An analogy and some illustrations may help to clarify this fundamental concept of exhaust system design:

An automobile requires more gas to accelerate from rest to 40 miles an hour than it does to travel the same distance at 40 miles per hour. Much of the power has been used to overcome inertia and give the auto a velocity pressure (energy not used in overcoming friction but available to coast after the engine is stopped or to be expended by braking if the car is stopped sooner).



Adjustable hoods may be required where different operations are performed at the same station.

Similar energy is required to move air from relative rest in a workroom to the specified velocities in an exhaust duct.

An automobile requires less gas to accomplish this acceleration on a smooth, hard-surfaced road than on a rough gravel or dirt road.

In like manner, less energy (entrance loss) is required to move air through a flared hood which gradually changes its shape than through a hood with abrupt changes in shape or direction of air travel.

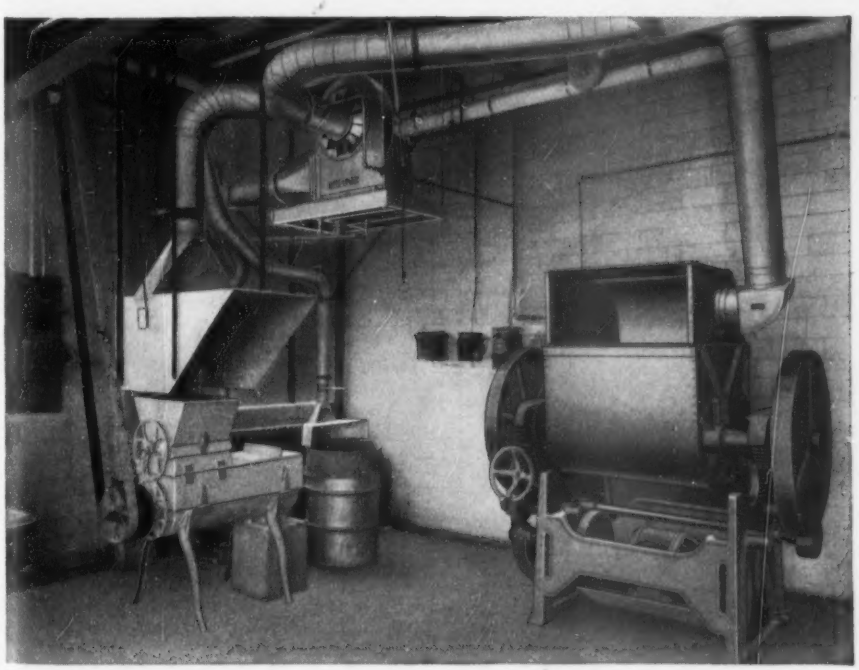
Illustrations of various hood suctions are shown in Figures 1 through 4 (see next page).

Note that the air volume and velocities moving into the hood are the same for each hood illustration. Consequently, the exhaust effectiveness of both arrangements will be identical. Yet the hood suction shows marked variation due to different velocities in the branch pipe, Figs. No. 1, 2, 3; or different entrance loss, Fig. No. 4.

These illustrations are intended to point out that the actual static pressure reading (the hood suction) can vary widely dependent on the branch pipe velocities and hood entrance loss. However, once the hood design has been established and the branch pipe determined, *any change from the original hood suction can only indicate a change in velocity in the branch and consequently a change in air volume removed from the hood.* This relation will be true unless:

1. The hood design has been changed which would affect the ease of exhausting the air volume (entrance loss);

2. Obstructions or accumulations exist in the hood or branch ahead of the point of hood suction reading. Restrictions of the cross sectional area will reduce the air volume, although the hood suction may even increase, depending on location and degree of accumulation.



Fine materials can be confined from mixer and filling operations.

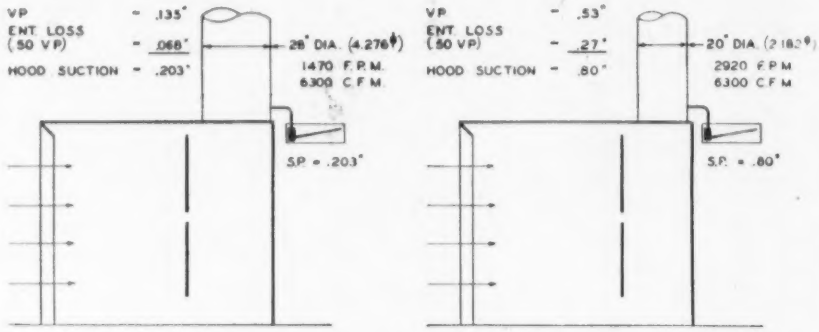


Fig. No. 1 Spray Booth (7′ x 6′ Face)

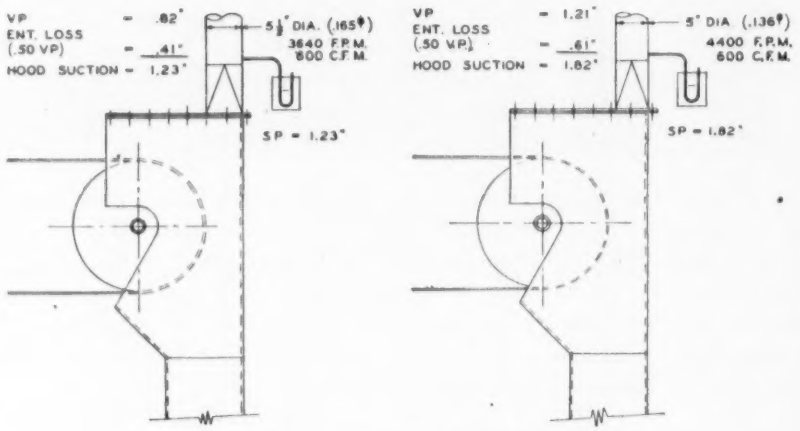


Fig. No. 2 Transfer Point (20″ Belt)

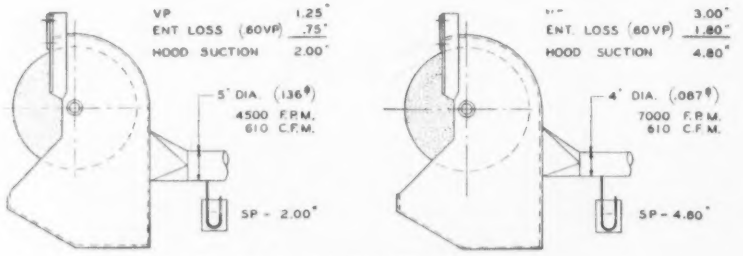


Fig. No. 3 Grinding Wheel (20″ x 3″)

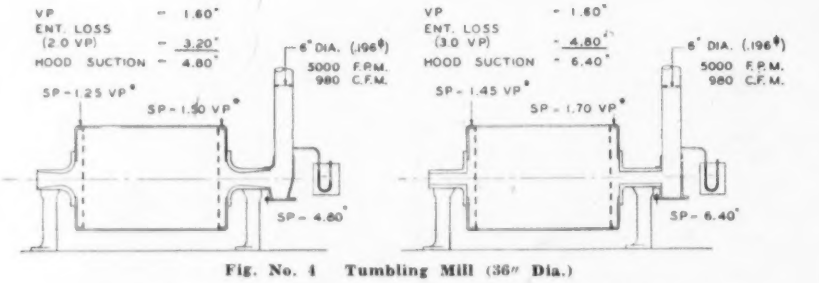


Fig. No. 4 Tumbling Mill (36″ Dia.)

Note: Entrance losses vary widely with design of tumbling mills.

Hood suction is a function of hood design and conveying velocity in the connecting branch. Figures 1, 2 and 3 indicate the variation in hood suction caused by change in branch diameter from identical hoods. Figure 4 illustrates variation in hood suction with change in entrance loss.

Measurement of Hood Suction

At the time of exhaust system installation, a 1/16″ hole should be drilled in each branch connection for static pressure (hood suction) readings. The hole should be perpendicular to the duct, in a straight section (4—6 diameters long if possible) at least one diameter from hood or connecting elbow. Such small holes will be in addition to larger pitot tube holes for actual measurement of air flow.

A vertical U-gage (Fig. 5) is satisfactory for static pressure readings above 0.8″. Use an inclined design (Fig. 6) for lower values. Both designs are inexpensive. The vertical type can be made with a scale divided into tenths of an inch and a bent glass tube approximately ⅛″ inside diameter mounted on a support (Fig. 7).

The gage is leveled and zeroed and the length of rubber hose attached to the proper side (either side of the conventional U-gage).

Reading consists of measuring the distance in inches between the top of the water columns in both legs of the U-gage. Most manufactured gages use a special gage oil with scales calibrated for the specific gravity and with the reading indicated on only one leg of the gage. One should be certain that the end of the rubber tubing is held tightly over the hole in the duct while the reading is taken. Folding over the end of the rubber hose assures a tighter fit. One should also check tubing for kinks or sharp bends that would close the passage (see Fig. 8).

The easily obtained static pressure reading not only furnishes an accurate check on performance, but the amount of change can be quickly calculated. It has been previously shown that hood suction is a static pressure equivalent to the velocity pressure in the branch plus the entrance loss which can be stated in terms of percentage of velocity pressure. Velocity pressure, entrance loss and most pressure losses vary as the square of the velocity of air flow.

if CFM^a = cubic feet of air per minute originally exhausted;

CFM^b = cubic feet of air per minute exhausted during test;

SP^a = hood suction originally noted;

SP^b = hood suction during test;

$$CFM^b = CFM^a \frac{\sqrt{SP^b}}{\sqrt{SP^a}}$$

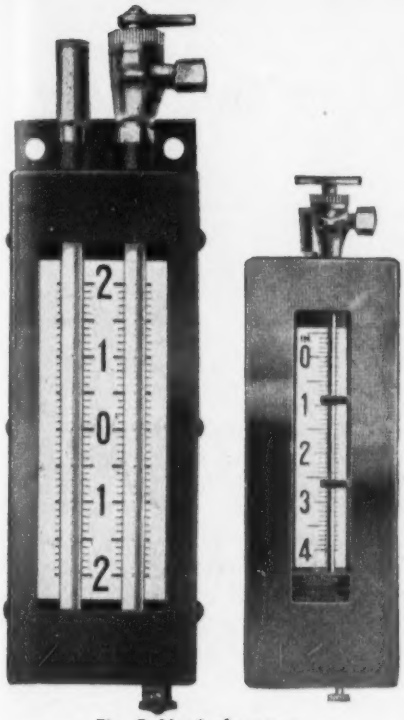


Fig. 5. Vertical gages.

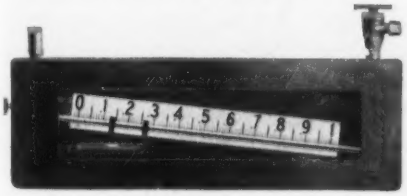


Fig. 6. Inclined gages.

or in terms of conveying velocities in the branches—

FPM^a=feet per minute originally maintained;

FPM^b=feet per minute during test.

$$FPM^b = FPM^a \frac{\sqrt{SP^b}}{\sqrt{SP^a}}$$

While it is possible to approximate the actual volume of air exhausted through a branch duct from the hood suction readings, such approximations necessitate estimation of the entrance loss of the hood.

Unless such estimates are based on considerable experience, they are subject to appreciable error. Consequently, a pitot tube should be used for determination of original air volumes and the use of hood suction readings restricted to checking for change in exhaust volumes.

The pitot tube which measures the velocity of air flow in the duct can, of course, be used for routine check purposes instead of the static pressure method described above. In either case an understanding of hood suction is essential.

The hood suction method of checking can more readily be delegated to an assistant without technical training than the pitot tube where care must be exercised in reading velocity pressures in the correct location with the tube paralleling the flow of air. U-gages have been standard plant equipment long enough to eliminate any feeling of uncertainty in their use.

Since pressure readings vary as the square of the velocity or volume in question, a slight change is magnified by comparison of gage values. Normally, a reduction of volume or velocity of 10-15 per cent will not be sufficient to reduce the effectiveness of the exhaust system. This range is equivalent to a reduction in static pressure readings of 19-30 per cent.

Causes for Reduction

A marked reduction in hood suction can often be traced to one or more of the following items:

1. Reduced performance by the exhaust fan caused by reduced speed due to belt slippage, wear on motor or casing, or accumulation in rotor or casing that would obstruct air flow;

2. Reduced performance caused by defects in the exhaust piping, such as accumulations in branch or main ducts due to insufficient conveying velocities, condensation of oil or water vapors on duct walls, adhesive characteristics of material exhausted, or leakage losses caused by loose cleanout doors, broken joints, holes worn in duct (most frequent in elbows) or poor connection to exhauster inlet;

3. Losses in suction can also be charged to additional exhaust points added to the system (sometimes systems are designed for future connections and more air than required is handled by present branches until future connections are made), or to change of setting of blast gates in branch lines. (Blast gates adjust the air distribution between the various branches. Tampering with blast gates can seriously affect such distribution, and therefore gates should be locked in place immediately after the system has been installed and its effectiveness checked.)

4. Reduced exhaust volume may be caused by increased pressure loss through dust collector due to lack of maintenance, improper operation, wear, etc. These items will vary with the collector design. Refer to operation and maintenance instructions furnished with the collector or consult the equipment manufacturer.

Summary

Unless the hood design is altered or there are accumulations in hood or branch pipe between hood and point of hood suction reading, the air volume exhausted from a hood cannot change without a change in hood suction reading. If the operation or material is not altered and the hood design is unchanged, the continued effectiveness of an exhaust system can be assured as long as the hood suction, and consequently the exhaust volume, is maintained.

Under these conditions periodic hood suction readings provide an accurate check on the performance of an exhaust system when they are compared to previous readings taken when the system was known to be fulfilling its function.

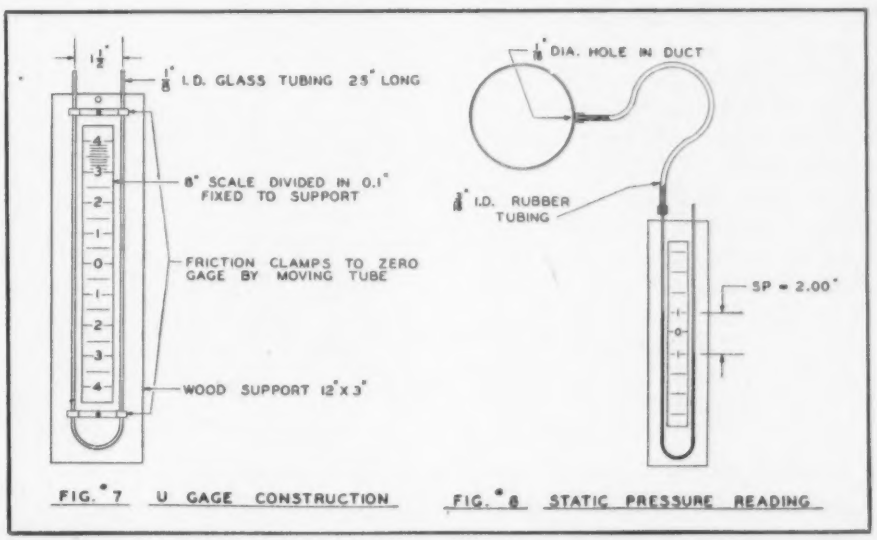


FIG. 7 U GAGE CONSTRUCTION

FIG. 8 STATIC PRESSURE READING

New Lead-Coating Process Eliminates Use of Zinc Alloy

By W. YONKMAN

Engineer, Western Electric Company, Kearny, N. J.

By a new hot-dipping process, hardware parts for outdoor service are being coated with lead without the use of zinc. The process is so new that life tests have not yet been made, but the necessity for cutting down on the use of zinc and obtaining protective characteristics of lead are strong arguments in favor of it.

BECAUSE of the increasing need for zinc in connection with the war effort, which was apparent early in 1941, Western Electric Company felt that steps should be taken at that time to find a substitute for the zinc used in the hot-dip galvanizing of pole line hardware, thereby releasing this essential metal for more urgent requirements. Several substitute materials were considered, including organic finishes, lead and various alloys of lead. Since many of the metals which might be used in lead alloys, especially tin, were also on the critical list, effort was concentrated on the use of commercially pure lead, particularly since the available supply seemed abundant. Up to the present, the coating of steel by the lead-dipping process has not, so far as we know, been used commercially on a large scale, although some relatively small units have been in operation.

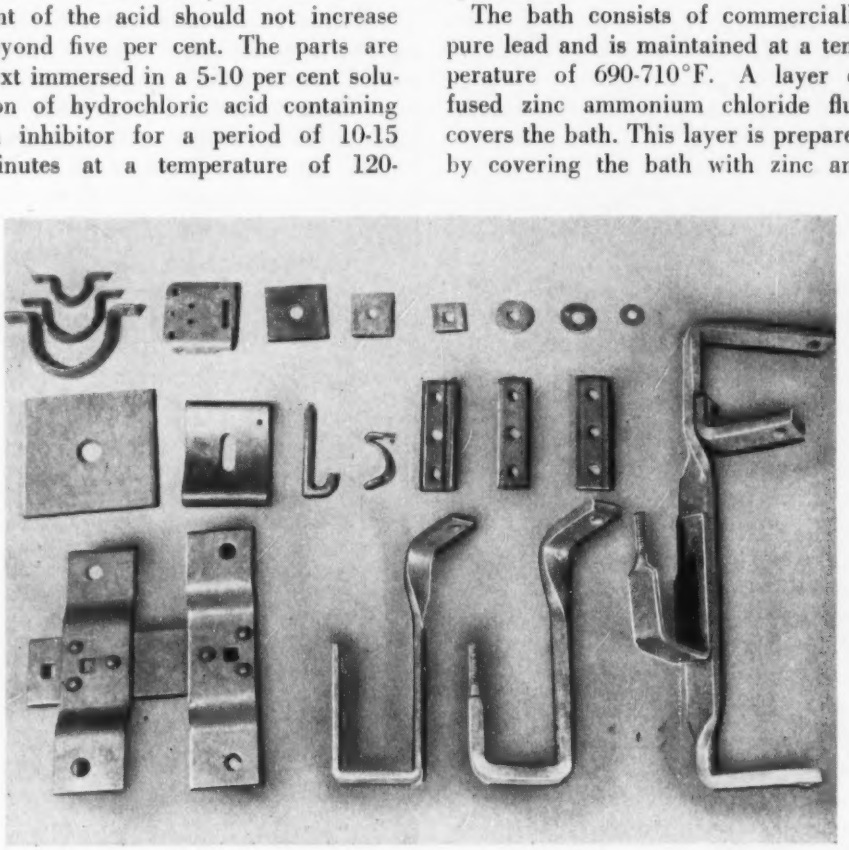
The value of lead coatings as a protection against corrosion of iron and steel has been discussed to a considerable extent in literature and some of the difficulties of application have been pointed out. Lead coatings are resistant to atmospheric corrosion and will, no doubt, give long protection to iron and steel if a continuous film substantially free from pin holes is applied. It is recognized, however, that pin holes are usually present in lead coatings applied by hot dipping. A superficial rust often appears on lead-coated parts shortly after application of the coating and it is believed by some that the pin holes are quickly sealed, affording better protection to the underlying iron and steel than might be expected or than appearance might indicate.

Since no alloying layer is formed between iron and lead, the iron surface is not wetted by the lead and, unless proper care is taken in the application of the coating, the lead forms in globules on the work, leaving part of the steel surface exposed. This difficulty is greatly reduced in the method used by Western Electric, which method also makes the process practicable for large-scale production.

Oil is removed from the work by any suitable cleaning method. Rust and scale are removed in a solution of sulfuric acid. A 6-12 per cent sulfuric acid solution containing an inhibitor and operated at approximately 160°F. is satisfactory. The iron content of the acid should not increase beyond five per cent. The parts are next immersed in a 5-10 per cent solution of hydrochloric acid containing an inhibitor for a period of 10-15 minutes at a temperature of 120-150°F. The iron content of this solution should not increase beyond five per cent.

The parts are then immersed in a solution of zinc ammonium chloride flux at room temperature until they are completely wetted. This solution is made by dissolving five parts of zinc chloride and one part of ammonium chloride by weight in six parts of water. This flux solution should be kept reasonably free of iron sludge at the bottom of the container. Concentration of iron in this solution should not increase beyond eight per cent. The parts must remain wet with this flux solution when they are placed in the lead-coating bath. Water rinsing should not be used after any of the foregoing operations, except when alkali cleaners are used in the first operation.

The bath consists of commercially pure lead and is maintained at a temperature of 690-710°F. A layer of fused zinc ammonium chloride flux covers the bath. This layer is prepared by covering the bath with zinc am-



Lead coated pieces used as substitutes for zinc coated parts for hardware on telephone and telegraph poles.

(*Reprinted with permission from* PRODUCT ENGINEERING, *May*, 1943)

Preparatory steps in the lead-coating process are shown in the diagram at the left. From the zinc ammonium chloride flux solution the parts go to the lead dipping tanks shown in the photograph. Cross-section view of the tank at the right shows the fused flux floating on top of the molten lead.

monium chloride crystals and allowing them to melt and fuse thoroughly before dipping is begun. The layer should be prepared at least two hours before the parts are dipped in the bath. When the flux is in its best operating condition, it is a thoroughly fused, dark liquid layer with a minimum thickness of $\frac{1}{8}$". Very meagre fumes are given off at the proper working temperature. No additions are required for several days after operations begin except replacement of flux which is carried out by the work to prevent areas of exposed metal on the surface of the bath. When such additions are necessary they should be made in small quantities and in such a way that unfused flux crystals do not come in contact with parts being dipped. In no case should such additions be made at the exit end of the pot. When the pot is inactive, larger quantities of flux may be added provided such additions are made at least two hours before the pot is used.

The parts are passed in and out of the bath through the flux several times to insure contact of all surfaces with the flux. They are then submerged in the bath or allowed to float until heated to the temperature of the bath. Before withdrawal they are again passed several times through the flux until completely coated. After removal from the bath, excess metal is immediately removed by suitable shaking or centrifuging, depending on the nature of the part, following which the parts are quenched in hot water. They should be removed quickly from the hot water to expedite drying. In the case of small parts, tumbling in sawdust may be advantageous. Parts not completely coated may be reprocessed, without removing the coating already on the parts, by beginning with the hydrochloric acid dip.

The lead bath does not give satisfactory results until after it has been in operation for several days. From then on it seems to improve with use, an observation which was made experimentally as well as commercially. Although an analysis of the bath has been made periodically, lack of time has prevented study to determine the change which results in this improvement.

The weight of the lead coating varies between 30 and 200 mg. per square inch. The type of parts, the temperature of the bath and the degree of centrifuging or shaking after dipping are determining factors in the weight of coating which, in general, is somewhat thinner than the zinc coating produced by hot dipping.

No changes in equipment are necessary in converting a hot galvanizing unit to a hot lead dipping unit. The molten zinc should be ladled from the pot as completely as possible and replaced with lead. The lead bath is then heated to the temperature formerly used for galvanizing, which will float the residual zinc to the surface where it can be removed by skimming. Frequent skimming for a few days will eliminate the zinc except for a small quantity amounting to a few tenths of one per cent, and this appears to alloy with the lead. The bath should not be used for coating during this skimming period. The dipping unit used by Western Electric is capable of producing approximately 3,600 pounds per hour of lead coated hardware.

Lead dipping has several operating advantages over hot galvanizing. There are no losses of metal due to dross and the time required to remove dross is therefore eliminated. The life of the equipment is lengthened considerably because of the lower temperature used and because the lead and iron do not alloy. Skimming and replacement of flux on the molten lead bath are required less frequently than with zinc.

Although Western Electric Company is applying lead coatings to over 60 per cent of pole line hardware, time has not permitted life tests to be made under all operating conditions. However, the deposit obtained together with the inherent protective qualities of lead make this coating a satisfactory substitute.

In our early work on lead coating, numerous experiments were also made with various lead alloys, using the application procedure described above. Lead alloys containing about three per cent of antimony showed favorable results in producing smooth coatings having good covering properties.

The Antiquity of Tools

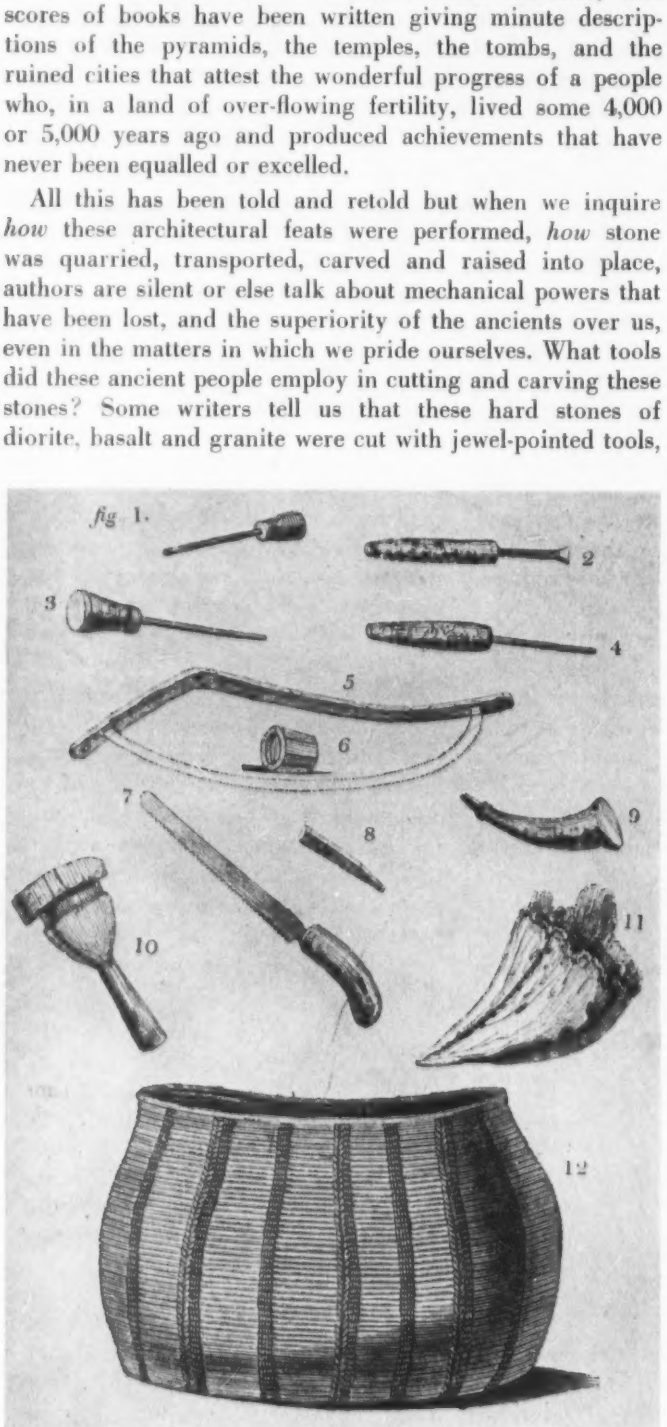
By JOSEPH DANFORTH LITTLE

Bloomfield, N. J.

PART II

THE early part of Egyptian history is coeval with the arrival of Abraham and Joseph and the Exodus of the Israelites and we know from the Bible what the state of the world was at that time. From the time of Moses downward the art and civilization of the early Egyptians have furnished a theme to writers and travelers, and scores of books have been written giving minute descriptions of the pyramids, the temples, the tombs, and the ruined cities that attest the wonderful progress of a people who, in a land of over-flowing fertility, lived some 4,000 or 5,000 years ago and produced achievements that have never been equalled or excelled.

All this has been told and retold but when we inquire *how* these architectural feats were performed, *how* stone was quarried, transported, carved and raised into place, authors are silent or else talk about mechanical powers that have been lost, and the superiority of the ancients over us, even in the matters in which we pride ourselves. What tools did these ancient people employ in cutting and carving these stones? Some writers tell us that these hard stones of diorite, basalt and granite were cut with jewel-pointed tools,



Egyptian carpenter tools 5,000 years old. Found in a tomb at Thebes.

in the form of straight and circular saws, solid and tubular drills and engraving tools. Some of these stones were of granite, 8 feet by 12 feet. When the Egyptian pyramids were erected, tools were in a highly advanced stage. Of this there is ample evidence—their measuring tools were so true, that, at the equinox, the rising sun just grazed the sides with light.

In the Salt's collection in the British Museum there are numerous axes and hatchets from a tomb at Thebes. On a bronze hatchet and on a bronze adz, as well as on a bronze saw, the name of Thothmes III of the 18th Dynasty (1450 B. C.) appears.

Note that these were in use about 3,400 years ago. On another axe blade is the name of Ata, an officer in the time of the Sixth Dynasty. In this museum, in the first Egyptian room, may also be seen a basket of carpenter's tools found in one of the tombs at Thebes. Figures 1, 2, 3 and 4 show chisels and drills; Figure 5, a drill bow; Figure 6, a nut of wood belonging to a drill; Figures 7 and 8, saws; Figure 9, a horn for oil for sharpening tools (such horns may still be seen in many a country wheelwright's shop); Figure 10, a bell-shaped wooden mallet or hammer such as are used by masons at the present time; Figure 11, a bag for bronze nails, and Figure 12, the basket which held the nails and tools. There were also found in the tomb hatchet heads, adzes, knives, chisels with wooden handles, drill spindles and drill caps. This kit of tools, it would seem, would compare very favorably with the carpenter's tool kit of today.

Many of the paintings which appear on the walls of the tombs give us an insight into the habits and customs of the ancient Egyptians. There are shown processes in agriculture, in the manufacture of weapons of war, views of boats and fishing, athletic sports, and methods of executing various handcrafts, showing many of the tools used during this early period. It does not seem unreasonable to ask that we regard these tools as typical of the tools used in the days of Abraham and very near the time when our Scripture history begins, for these tombs and grottos were erected about 600 years after the Deluge. From the sculptures of Beni-Hassan and on similar tombs at Thebes, we learn that the Egyptians were acquainted with the manufacture of linen, glass, cabinet work, chairs and couches, gold and silver, shoes and sandals, ornaments, coverings for chairs, and numerous other objects indicative of art and skill.

That they played ball, as we play, is also established by the sculptures. They made toys, such as fishes, dolls, beads and balls for their children as we do. Their dentists could not only fill decayed teeth with gold as our dentists do, but they could insert false teeth and secure them by means of gold wire. This is established by the fact that such have been found in the jaw of one of the Egyptian mummies.

All this is mentioned to show that the tools of that period were many and of a high order. Embroidery and needlework of various kinds were executed and this indicates to us that needles were well known. Specimens of these

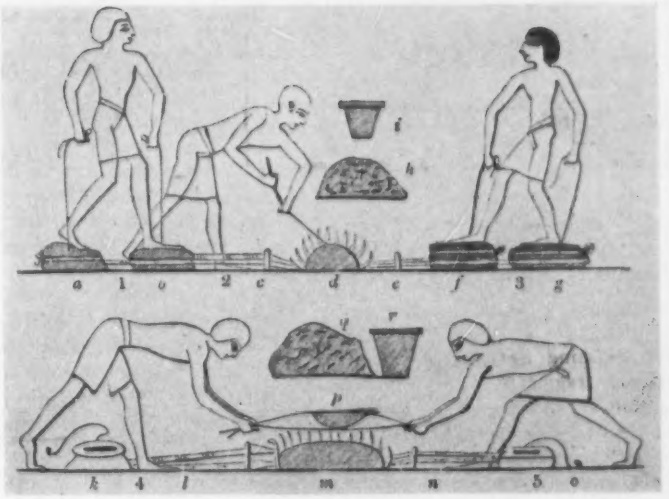
ancient needles and many of the tools mentioned may be seen in the Egyptian collection at the Metropolitan Museum of Art in New York. The needles are very similar to the bone ones of the geologically pre-historic times. The tumbler lock, which consists in the use of movable impediments acted on only by the proper key, was well known to the ancient Egyptians, the representation of such a lock being found sculptured among bas-reliefs which decorate the great temple at Karnak. The early Egyptians when grinding their corn, used oval stones lying crossways and sliding from end to end. A specimen of this, which archaeologists tell us was in use before 5,000 B.C., is in the British Museum. The ancient Egyptians harnessed water power by mounting in mid-stream a boat with mill stones geared to the paddle wheels. At a very early age, about 2,400 B. C., they used the bow-drill which made a hole by heat, generated by the friction of one piece of wood against another.

Many of the occupations of these ancient people are portrayed upon the walls of the tombs and temples at Thebes. These beautiful and accurate wall carvings and paintings show work and workers carved into the hard stone or painted on the tomb walls, so today we can see the pictures of the early Egyptian tools and these indicate to us just how these tools were used.

There can be no doubt that the tools and contrivances represented on these tombs were in use long prior to the general adoption of them as types for mural painting and these arts must have been held in high repute. At that time many of the trades, especially the carpenters, were formed into guilds or societies for mutual improvement. Bronze, the alloy of copper and tin, was the Egyptian's tool-steel, his cast and wrought-iron, in short, all that iron and steel are to the American workman of today. After the art of casting copper became known, the demands for it became great and trade with other countries began and the ancient people in Egypt, Spain and several other countries began to dig for copper and to make tools and weapons which they not only used but traded with other countries that had no copper, and thus began an interesting exchange of commodities. Some of these old traders would make tools of bronze and travel across rivers and over mountains to exchange them for other materials and on their way would bury a part of them in the ground, while they went further on to trade. Some of these hoards are found today, where they were buried thousands of years ago.

On some of the paintings in the Egyptian tombs are shown men and boys sitting around a fire, each with a long pipe with which they blow on the fire in order to melt the metal. This method was used in Egypt for a long time, but it was a slow process and required the services of a number of men or boys.

Later, bellows were made out of skin bags with tubes pointing towards the fire. The men could blow the fire and pump air on it by stepping on the bags. This remarkable invention was used as early as the reign of Thothmes III, the contemporary of Moses, and was represented in a tomb bearing the name of Pharaoh. It consisted of a leather bag, secured and fitted into a frame, from which extended a long pipe for carrying the wind to the fire. These were worked by the feet, the operator standing with one under each foot, and pressing them alternately, while he pulled up each exhausted skin with a string he held in his hand. One painting shows the bellows full of air with the man's foot removed,



BELLOWS

a, b, f, g, the leather case; *c, e, l, n,* the pipes conveying the wind to the fire; *d, m,* the fire; *h, q,* charcoal; *k* and *o* are raised as if full of air.

and this would imply a knowledge of the valve.

Workmen of this period who contributed so much to social comfort, such as cabinet makers, stone masons, sculptors, potters, glass blowers, quarry men, weavers, fullers, tanners, silver and gold workers were not lightly esteemed. In some countries it was the custom to bury a worker with his tools, just as the warrior of old had his weapons placed beside him in his grave, and from these tools we are able to get a correct picture of the tools used long ago. The artisans of Egypt, much like the best type of handcraft artisans of today, were attached to their tools, for a good craftsman entertains a true and real affection for the implements he uses daily, especially those which are his agents in the production of approved work.

These early people had many interesting forms of tools and weapons which were not found in other lands. From about 6,000 to 5,000 B. C., their axe was a plain square in form. Later, the round axe was adopted and used until about 3,000 B. C. The favorite tool of the early Egyptians was the adz. The first adzes were thin pieces of metal lashed to the end of a bent stick. These were used about 5,500 B. C. Later the blade of the adz was widespread. About 3,000 B. C. they used a peculiar type of sickle. The usual tools of the Egyptian carpenter were the axe, adz, a handsaw, chisels of various kinds, a ruler, a plummet and a right angle, a leather bag containing bronze nails, a hone and a horn of oil. These constituted the principal and perhaps the only implements he used. In burnishing and in planishing metals, the workman used flat, smooth stones where we, when burnishing, use tools of metal, although even today agate burnishers are used for finishing fine silver and other metals such as copper printing rolls. The ancients also used smooth stones for polishing and rubbing down wood and stone. Copper seems to have been used before iron, for there is evidence that the earliest Egyptian statues were carved with copper chisels.

An Egyptian painting in the grottos of Beni-Hassen represents two glass blowers at work. They are using long tubes exactly as glass blowers do today, only these men are kneeling or sitting on the ground and the crucible in which the glass is being melted is different from ours.

Patent Abstracts

Barrel Finishing Material

U. S. Pat. 2,318,579. W. G. Balz and L. R. Davidson, said W. G. Balz assignor to Louise M. Balz, May 11, 1943. A tumbling material for polishing metal articles comprising irregular fragments of crushed limestone of a plurality of sizes and shapes and roughly of the order of one-eighth inch to one and a half inches in longer dimensions, steel balls, and soap and water, the fragments of limestone and the steel balls being in approximately the proportion of two-thirds crushed limestone.

Barrel Finishing Material

U. S. Pat. 2,318,580. W. G. Balz and L. R. Davidson, said W. G. Balz assignor to Louise M. Balz, May 11, 1943. The method of finishing including the steps of tumbling the work in a mixture including water and an abrasive, and such quantity of irregular fragments of fractured granite of widely varying shapes and sizes as will submerge the work with the work and the granite fragments freely movable relative to each other while being tumbled, the granite fragments having the sharp points and angles thereof previously removed, washing to remove the abrasive and thereafter further finishing the work by tumbling the same in a mixture including such quantity of irregular fragments of fractured limestone of varying shapes and sizes and having the corners and angles thereof previously removed and having smooth surfaces, and steel balls approximating one-half the weight of the limestone fragments and a soapy solution, the mixture being of such quantity as will submerge the work, and with the limestone fragments and steel balls freely movable relative to each other.

Barrel Finishing Material

U. S. Pat. 2,318,581. W. G. Balz and L. R. Davidson, said W. G. Balz assignor to Louise M. Balz, May 11, 1943. The method of treating limestone fragments of widely varying irregular outlines and widely varying sizes which are in substantially the condition resulting from the fracturing of the limestone which comprises tumbling such fragments in the presence of an abrasive until the sharp points and edges have been removed therefrom without destroying the irregular outlines thereof, washing the same to remove the abrasive and thereafter subjecting such fragments to tumbling in the presence of an abrasive and an emulsifiable oil until a substantial amount of the oil has been absorbed by the fragments and they have smooth surfaces.

Sulfamate Plating Baths

U. S. Pat. 2,318,592. M. E. Cupery, assignor to E. I. duPont de Nemours & Co., May 11, 1943. In a process for the electrodeposition of a metal selected from the group consisting of nickel, copper, and lead, the step comprising effecting deposition by passing an electric current through an aqueous electrolyte consisting essentially of the metal cation and the anion—$SO_3 \cdot NH_2$.

Example:

Ammonium sulfamate	100	g./L.
Copper sulfate	130	"
Caustic soda	7.5	"

Example:

Sulfamic acid	107	g./L.
Litharge	36.6	"

Example:

Ammonium sulfamate	50	g./L.
Sulfamic acid	53.5	"
Nickel carbonate	35	"
Ammonia	10	cc./L.

Corrosion Prevention of Metals

U. S. Pat. 2,318,606. M. T. Goebel & I. F. Walker, assignors to E. I. duPont de Nemours & Co., May 11, 1943. The process for the prevention of atmospheric corrosion of metal surfaces capable of corrosion, which comprises treating the said surfaces with a long chain amine salt of orthophosphoric acid, said long chain being a hydrocarbon chain.

Example:

Mono, di and trialkylammonium phosphates.

Corrosion Prevention of Iron and Zinc

U. S. Pat. 2,318,642. J. S. Thompson, assignor to Parker Rust Proof Co., May 11, 1943. An article of metal selected from the class consisting of iron, steel and zinc and having formed thereon a thin continuous adherent protective and bonding coating composed essentially of an oxide of the metal and of an oxide of another metal below magnesium and above hydrogen in the electromotive series, said coating being formed by reaction of the metal of the article with an acidulous aqueous solution of an oxidizing agent for said metal and a salt of said other metal, and having a siccative coating covering said coating formed by reaction of the metal.

Example:

Water	1 gal.
75% phosphoric acid	20 cc.
Sodium chlorate	20 g.

Spray for 1 minute at 100° F. Increasing the phosphoric acid content or the temperature improves the action. The action is also improved by the addition of 0.002% or more of silver, copper or manganese added as the sulfate.

Corrosion Prevention of Zinc

U. S. Pat. 2,318,656. J. S. Thompson, assignor to Parker Rust Proof Co., May 11, 1943. An article with a surface containing zinc carrying a chemically bound coating which is predominantly oxide and contains zinc oxide, and which also contains hexavalent chromium.

Example:

75% phosphoric acid	18 cc./gal.
Sodium chlorate	20 g./gal.

Treat at 100-160° F. for 2 minutes and follow by a chromic acid rinse.

Buffing Wheel

U. S. Pat. 2,318,986. H. R. Benbow, assignor to Divine Bros. Co., May 11, 1943. In a buffing wheel of the one-way rotation type, and having a rigid center and projecting therefrom a working zone reaching to the periphery and composed of annular rings of fabric having their periphery cut on the bias, said rings being formed of long strips of fabric puckered on their edges toward said solid center, said long strips being formed of shorter pieces of fabric cut on the bias with their angular ends sewed to adjacent short pieces resulting in seams extending diagonally of said long strips producing an acute angle of fabric on one side of each seam adjacent the periphery and an obtuse angle on the other side, the acute angles that would project towards the work being trimmed off to make an obtuse angle.

Stripping Films

U. S. Pat. 2,319,596. A. W. Grant, assignor to U. S. Rubber Co., May 18, 1943. The method of forming an iron mold which consists in forming a matrix having a surface of copper, coating the copper surface with a thin layer of silver deposited by displacement, electrodepositing a thick layer of iron on the silver and separating the iron with the silver layer from the copper surface.

Thickness Measurement

U. S. Pat. 2,319,624. S. Anderson & R. W. Manuel, assignors to Crane Co., May 18, 1943. An apparatus for measuring electrolytically the thickness of metallic plating, the apparatus having means for attachment to a source of electrical current and in which the plating serves as the anode, comprising in combination a frusto-conical container for an electrolyte, the frusto-conical form of the said container extending immediately upwardly and outwardly from its open bottom, the said container serving as the cathode, a gasket having an aperture therethrough of a diameter equal to the diameter of a local anodic area to be measured, the said gasket aperture being of substantially less diameter than the lower end of the open bottom of the said frusto-conical container, whereby when the said frusto-conical container is placed over the gasket aperture and the current is passed therethrough the distribution of current over the anodic area is substantially uniform throughout.

Bipolar Electrode

U. S. Pat. 2,319,624. R. C. Olsen, assignor to Ternstedt Mfg. Co., May 18, 1943. The combination with a tank, an electroplating electrolyte therein, anodes fixedly supported in said electrolyte, work-supporting means arranged to travel through said electrolyte past said anodes and to support irregularly shaped work, and means to cause electric current to flow through said electrolyte between said anodes and said work, of a current-collecting and distributing device spaced from said anodes and unconnected therewith but positioned in the path of said current, said device having a current-collecting part composed of metal other than the plating metal positioned nearer the anodes than the work and a current-distributing part composed of plating metal positioned nearer the work and conforming in contour to the contour of irregularities of the work throughout substantially the entire area of the irregularities, and means for insulatingly supporting said device fixedly upon the work so as to travel therewith.

Hot Dipping Machine

U. S. Pat. 2,319,817. W. P. Lohrman, May 25, 1943. A machine for applying a metal coating to metal sheets and the like, comprising a pot containing a molten metal bath, a pair of rolls horizontally disposed above the level of the molten metal bath, at least one pan extending beneath said rolls, said pan being adapted to contain sufficient molten metal to immerse the lower portion of the periphery of the rolls therein, a driven endless belt extending from beneath the level of the molten metal bath into proximity with respect to said pan, at least one bucket carried by said endless belt and constructed and arranged to transfer molten metal from the bath into said pan, means for maintaining substantially constant the level of molten metal in said pan, and a wall isolating that area of the surface of the molten metal bath through which said bucket operates from the remainder thereof.

Electrolytic Tin Recovery

U. S. Pat. 2,319,887. J. R. Stack, May 25, 1943. The process for recovering tin from a hydrochloric acid bath containing tin in solution which comprises electrolyzing the bath using insoluble anodes of the porous diaphragm type while adding a soluble copper compound and glue to deposit the tin cathodically together with a small amount, less than 1%, of copper separating the cathodic tin from the copper and recovering the tin.

Hot Dipping Machine

U. S. Pat. 2,320,129. A. W. Harris, assignor to The American Steel & Wire Co., of N. J., May 25, 1943. Wire coating apparatus comprising a bath of molten metal; a tube passing into said metal and terminating upwardly at a point beneath the surface of said bath; and means for causing a wire to pass through said bath and tube; there being means for preventing entry of molten metal into said tube at its submerged terminus.

Metal Spraying

U. S. Pat. 2,320,327. J. F. Meduna, assignor to Metallizing Engineering Co., Inc., May 25, 1943. In the method for applying spray metal to a metal surface with a high degree of bond, the improvement which comprises conditioning such metal surface for spray metal bonding by contacting multiple small individual areas of such metal surface with at least one metal electrode, including establishing contact between such metal surface and such metal electrode, electrically heating the contacting surfaces of said electrode and said metal surface by means of an electric current flowing, under conditions of resistance heating, through said contacting surfaces, to firmly bond fused electrode material to said metal surface, and causing small amounts of electrode material to be left deposited on said metal surface to thereby obtain a surface characterized by an irregular roughness with a multitude of projections with overhanging edges and minute craters with overhanging edges, and thereafter spraying metal onto the metal surface thusly conditioned.

Metal Spraying

U. S. Pat. 2,320,328. J. F. Meduna, assignor to Metallizing Engineering Co., Inc., May 25, 1943. In the method for applying spray metal to a metal-surfaced substantially cylindrical object with a high degree of bond, the improvement which comprises conditioning the metal surface of such cylindrical object for spray metal bonding by rotating such object about its axis contacting multiple small areas of the metal surface of said object with a metal electrode while said object is rotating, including, establishing contact between the metal surface of said object and such metal electrode, electrically heating the contacting surfaces of said electrode and said metal surface by means of an electric current flowing, under conditions of resistance heating, through said contacting surfaces while said object is rotating, to firmly bond fused electrode material to said metal surface, and causing small amounts of electrode material to be left deposited on said metal surface along the path of travel of said electrode when in contact with said metal surface while said object is rotating to thereby obtain a surface characterized by an irregular roughness with a multitude of projections with overhanging edges and minute craters with overhanging edges, and thereafter spraying metal onto the metal surface of such cylindrical object thusly conditioned.

Metal Spraying

U. S. Pat. 2,320,329. J. F. Meduna, assignor to Metallizing Engineering Co., Inc., May 25, 1943. A spray metal coated, metal-surfaced article which comprises an article having a metal surface, a layer of spray metal, and, intermediate said metal surface and said layer of spray metal, fused metal deposited upon and integrally bonded to said surface by fusion to said surface and characterized by an irregular surface frozen from semi-liquid state with a multitude of projections with overhanging edges and minute craters with overhanging edges, at least the majority of said projections and craters being in interlock with spray metal particles of said layer of spray metal, and at least the majority of said projections being in size and spacing substantially of the same order of magnitude as the size of spray metal particles in the spray metal layer.

Abrasive Blasting Machine

U. S. Pat. 2,320,364. W. L. Keefer, assignor to Pangborn Corp., June 1, 1943. Apparatus for delivering abrasive at an abrading velocity comprising a rotor having a plurality of blades extending outwardly with respect to the axis of rotation of said rotor; means to deliver abrasive near said axis of rotation; and a transfer mechanism interposed between said abrasive delivery means and said blades including a cup rotatable with said rotor with the edge of its open end lying substantially in a plane normal to said axis and between the ends of the inner edges of said blades, means to deliver abrasive from said cup into the path of rotation of said blades including a helical blade disposed about said axis and extending from a point within said cup to a point adjacent said cup edge, and means to prevent a substantial discharge of abrasive from said cup except at said latter point, said means comprising a blade having a portion overlapping said helical blade in a direction to define a discharge opening for said abrasive having substantially parallel side walls.

Anode Bag

U. S. Pat. 2,321,367. M. B. Diggin, assignor to Hanson-Van Winkle-Munning Co., June 8, 1943. An anode bag comprising a tubular envelope of woven fabric permeable to liquid, said bag being closed at the bottom and open at the top, and the fabric of said bag being impregnated and coated with an impermeable inert and electrically non-conductive plastic throughout a band or zone extending entirely around and for a short distance down from the top of the envelope.

Rack Coating

U. S. Pat. 2,320,442. A. E. Maibauer, assignor, by mesne assignments to Union Carbide and Carbon Corp., June 1, 1943. Electroplating equipment to be subjected to electrolyte including a part insulated from said electrolyte with a stretched elastic tape consisting essentially of a plasticized copolymer formed from a vinyl ester of an aliphatic carboxylic acid having from two to six carbon atoms with a member of the group consisting of vinyl halides and vinyl benzene, said tape being wrapped under tension on the part with the turns overlapping, the insulation on said part being substantially impervious to said electrolyte.

THIS IS WASHINGTON–

By George W. Grupp
METAL FINISHING's Washington Correspondent

Important Post-War Questions When the messengers of peace broadcast their good news, and the wheels of war born industry stop, how many metal finishing establishments will be ready to meet the changed conditions? How many metal finishing firms have given thought to how to sell their services to keep their plants going during the post-war period? These are important questions. Correct answers must be found to them if economic chaos and financial ruin are to be avoided by metal finishers. And, the time to think about them is now.

Post-War Dangers Men are prisoners when they bolt their doors against thought of tomorrow. Markets for the services of metal finishing firms are not created by men who lose themselves in the darkness of smug satisfaction. Plating equipment is not used to the full if its owners are too impatient to look long enough to discover mistakes in selling the services of their plants. Indifference about planning ways and means to market the services of metal finishing equipment will be rewarded with ghost plants.

Excess Equipment War work demands are responsible for the installation of barrel and rotary plating equipment which is far in excess of normal peace-time needs. Methods must be found to utilize this equipment or second-hand dealers will have to be found who know how to dispose of this surplus equipment. Fortunately some of the barrel and rotary equipment will be worn out because of its abnormal usage during these war times.

Vision Needed The only metal finishing plants which will have work when the dove of peace once more flies among men will be those owners who had the vision to properly merchandise the services of their equipment. Unfortunately, the lack of selling vision has always hindered the greatest possible progress of metal finishing establishments. Metal finishing firms should sell and advertise their services more effectively in the future, and not wait until some equipment manufacturer recommends them to customers. They cannot get very far by putting their lights under their hats. A wag once wrote: "Doing business without advertising is like winking at a girl in the dark. You know what you are doing, but nobody else does."

How to Prepare for Post-War Trade What should metal finishing firms do to prepare themselves for post-war trade? They should learn to plate on glass, plastics, and paper. They should learn to plate on magnesium. They should study the uses of substitutes and the industries in their respective communities. With this and other background they must seek out customers and not expect prospective consumers to find them out. They should go out and sell the services of their plants to manufacturers of nails, wire, cutlery, hollow ware, plumbing supplies, lighting fixtures, automobiles, surgeons' and dentists' instruments, hospital equipment, household utensils, stoves, mechanical pencils and fountain pens, hardware, jewelry, sewing machines, typewriters, and other commodities.

Selling Metal Finishing Service They should point out to manufacturers the advantages of plating as applied to their particular products. They should show manufacturers how plating will improve the appearance of their products, make them more durable, and increase their sales appeal. They should learn to understand manufacturers' costs and then talk to them with faith and not fear. They should sell the appearance of their workmanship and their shops, and they should invite prospective customers to visit their establishments to see the care with which work is done and to observe the neatness of their plants. They should offer an engineering service which will help customers to determine the best kind of finish for their particular goods.

Joint Engineering Service The average metal finishing establishment is not in a position to offer the type of engineering service suggested. Therefore a number of metal finishers in a community might find it to their advantage to embark on a joint venture to engage some one, or research firm, capable of rendering impartial service to their customers.

An Opportunity for AES The American Electroplaters' Society could do something to help platers to keep their plants busy in the post-war period. Of course, the sole present function of the AES is to promote technical research and procedure and not selling. For this reason the Society may hesitate to embark on a venture which would increase the volume of business for platers. And yet a knowledge of technical research and procedure lacks economic value until it is sold for practical purposes. Therefore, the AES should increase its usefulness and prestige by sending out able speakers to address engineering societies, chambers of commerce, manufacturing associations, and even some Rotary and other businessmen's luncheon clubs for the purpose of pointing out (1) the advances made in plating, (2) the advantages and disadvantages of each kind of finish on different materials and products, and (3) how plating can help increase the eye appeal of a manufacturer's products and thus aid him in breaking down sales resistance.

Abrasive Order Amended Conservation Order M-319 as amended July 29, 1943 requires that beginning August 10, 1943, and bi-monthly thereafter, producers of manufactured crude abrasives and abrasive grain must file their proposed schedule of production for two months in advance on Form WPB-2782 for crude abrasives, and on WPB-2780 for grain abrasives. Applications for authorization to use or accept deliveries of manufactured crude abrasives during September and October must be made on Form WPB-2779. Form WPB-2781 must be used in making authorization application for abrasive grain.

Acetic Acid Allocation Control It has been estimated by WPB that there will be a 50,000,000 pound shortage of acetic acid in 1943. As a result, Allocation Order M-243 was amended on August 7, 1943 to cover purchases of acetic acid and acetaldeyhde. When purchases in any month amount to 27,000 pounds or less, the buyer must certify their use to enable the supplier to indicate such use on his report on Form PD-602.

Advertising Costs In the "Green Book" which was issued jointly by the War and Navy departments, and which is officially known as "Explanation of Principles of Cost under Government Contracts" these paragraphs appear on page 51—"Advertising": As a general rule advertising is an inadmissible item of cost, on the reasoning that advertising is not required in order to do business with the Government. However, certain kinds of advertising of an industrial or institutional character, placed in trade or technical journals, not primarily with the object of selling particular products but essentially for the purpose of offering financial support to such trade or technical journals, because they are of value for the dissemination of trade and technical information for the industry are not really an advertising expense to effect sales so much as an operating expense incurred as a matter of policy for the benefit of the business and the industry. Here again the contractor's accounts should provide for suitable analysis to distinguish between possibly admissible and inadmissible costs." 52—"Selling and Advertising Expenses of Independent Subcontractors": The considerations relating to the admissibility or limitation upon ordinary and usual commercial selling and advertising expenses may have different aspects in the case of subcontractors than in the case of prime contractors dealing directly with the Government."

These paragraphs should be of special interest to metal finishing prime war contractors since Section 51 permits them to include in their cost plus contracts reasonable institutional advertising costs in trade papers. This is an opportunity for metal finishing prime contractors to support trade papers and keep their names before the trade.

Allotment Extension Permitted Interpretation No. 11 to Controlled Materials Plan Regulation No. 1 issued on July 14, 1943, makes it clear that manufacturers may use an allotment to replace in inventory the controlled materials used to make the product for which the allotment was originally made. This was done to help manufacturers in their speeding up of production. The interpretation also states, "a manufacturer of Class A products need not accept an order unless he receives an allotment of enough controlled materials for its manufacture even though he has enough in inventory to fill the order."

Aluminum Products Revised CMP Procedure The CMP regulations governing the acceptance of purchase orders for aluminum products in the form of controlled materials (except ingot), were revised by Directive No. 23 to CMP Regulation No. 1 issued on July 31, 1943. The directive provides that producers must refuse delivery of aluminum products, including authorized controlled material orders and orders covered by Aluminum-Magnesium (AM) authorized numbers, if they cannot make delivery in the month specified in the orders. To liberalize CMP procedure, if after accepting orders for delivery of aluminum products, the producers find they are unable to make the delivery in the requested calendar month, they may then fill the orders during the first of the following calendar month or calendar quarter without reporting this condition to the WPB. These orders must be filled ahead of all others, however.

Aluminum Sulfate Prices Raised To provide an adequate supply and to protect some manufacturers from present losses in the making of aluminum sulfate, the OPA issued on August 17, 1943 Amendment No. 18 to Revised Supplementary Regulation No. 14 to the General Maximum Price Regulation which grants permission to raise prices to cover the total cost of production.

Army Contract Termination Procedure On August 16, 1943 the War Department issued Procurement Regulation No. 15 on the settlement of contracts terminated because of shifting military requirements. The regulation furnishes to government contracting officers and to contractors directions as to the basis upon which a prompt determination and payment of the amounts due to contractors will be made whenever contract terminations are necessary. To assist contractors and government audit personnel, in the near future the War Department will issue an accounting manual. This manual will govern the preparation of cost information for use in negotiating termination settlements.

Birth Certificates Not Essential Because the War Department has received a great many letters of inquiry, the Army has issued a statement that workers who are unable to get birth certificates are not barred from employment in factories with government contracts except in plants classified as doing secret, confidential and restricted work. To employ aliens, contractors must obtain approval of the government agency involved. Where proof of citizenship is required and no birth certificate is available, the following policy was laid down by the War Department. "1. Producing an official certificate of naturalization or citizenship, or other satisfactory evidence of American birth. 2. If honorably discharged from the Army, Navy, Marine Corps, or Coast Guard of the United States, producing the honorable discharge certificate or such certificate as may be issued in lieu thereof, unless such certificates show on their face that the bearer was an alien at the time of issuance. 3. Executing a prescribed Declaration of Citizenship form in the presence of two witnesses, one of whom must be an Army, or Navy District Procurement, Factory or Plant Protection representative, if available, or an officer of the United States Army, Navy or Marine Corps, or a member of the Auxiliary Military Police on duty at the point."

CMP 4 Amended Numerous changes were made in Controlled Materials Regulation No. 4, as amended on July 17, 1943. The principal change is that a distributor is now permitted to refuse any order for steel which does not call for immediate delivery. All deliveries of brass and wire mill products are banned after September 30, 1943, except to fill authorized controlled materials orders. A warehouse which receives an authorized controlled materials order for copper from a customer and arranges for direct shipment by the producer or another supplier of the material, may not consider the delivery as made from its stock and may not request replacement. The amended order also revoked Wire Mill Directive No. 1, Brass Mill Directive No. 1, and Supplementary Brass Mill Directive No. 1-a because these provisions are now included in CMP No. 4 as amended.

Carbon Tetrachloride Price Regulation On August 5, 1943 Carbon Tetrachloride Maximum Price Regulation No. 79 became effective. The effect of this regulation is to raise the ceiling prices paid by western consumers and those located at great distances from warehouses and shipping points. This action was taken by OPA because these consumers have been unable to get this chemical for the reason that the western distributors claim they were unable to absorb the freight. In this order the United States was divided into four zones. The prices for each zone are as follows:

	ZONE 1	ZONE 2	ZONE 3	ZONE 4
Quantity	*Price*	*Price*	*Price*	*Price*
Tank cars	$0.0525	$0.0575	$0.0675	$0.06 per pound
Carload lots:				
50-55 gallon containers	.73	.80	.94	.83 per gallon
5 & 10 gallon containers	.97	1.04	1.17	1.07 " "
Less than carload lots:				
50-55 gallon containers	.80	.87	1.00	.90 " "
5 & 10 gallon containers	1.07	1.14	1.27	1.17 " "

Cadmium Conservation Drive The Conservation Division of the War Production Board is conducting a campaign to conserve cadmium, and it is urging the use of substitutes because the production of cadmium has remained practically stationary and because the future prospects of increased production of this commodity are not very bright. WPB experts point out that where corrosive conditions are not severe, lead coatings should be used instead of cadmium coatings. Information and help from WPB consultants on the use of cadmium substitutes should be addressed to the Division of Information, Conservation and Salvage Unit, 1100 H Street, N.W., Washington, D. C.

Canadian Non-Ferrous Metal Production Increased The Canadian Minister of Munitions recently released statistics which show that the production of refined copper increased from 232,000 tons in 1939 to 270,000 tons in 1942; refined lead from 191,000 tons to 243,800 tons; refined zinc from 175,600 tons to 216,000 tons, and refined nickel from 64,500 tons to 93,300 tons.

Class B Allotment Procedure The War Production Board on August 18, 1943 issued Interpretation No. 13 to Controlled Materials Regulation No. 1 which states, "(a) When the B product allotment procedure is followed in making allotments for the manufacture of a Class A product, all of the provisions of CMP regulations governing B products apply; (b) When the A product allotment procedure is allowed for making allotments for the manufacture of a Class B product, all of the provisions of CMP regulations governing A products apply."

Caustic Soda Stocks Adequate At the recent meeting of the Chlorine-Alkali Industry Advisory Committee of the WPB, it was brought out that manufacturers are reserving stocks of solid caustic soda for emergency lend-lease shipments. The domestic demands for caustic soda have increased but the supplies are adequate the committee was told.

Jewelry & Giftware Catalogue Hearing The Federal Trade Commission held a hearing in Washington on August 18, 1943 on its proposed trade practice rules for jewelry and giftware catalogues. The proposed rules deal with (1) misbranding and misrepresentation, (2) deceptive concealment of non-disclosure of weight of silver, (3) deceptive pricing, (4) misrepresentation of character of business, (5) deceptive set-up of disclosed information, (6) commercial bribery, (7) imitation of trade marks and trade names, (8) combination, suppression of competition or restraint of trade, (9) discriminatory prices, rebates, refunds, discounts and credits, and (10) aiding or abetting the use of uniform trade practices.

MRO Supplies Priorities Regulation No. 3, Directive 1 and Amendment 1, issued on July 16, 1943, states that the ratings assigned for the third quarter of 1943 for maintenance, repair and operating supplies may be used to the extent authorized on Form WPB-837 (formerly PD-408). The use of these ratings is permitted as an exception to the restrictions of Priorities Regulation No. 3 which prohibit the use of ratings assigned for MRO supplies for certain items on List B.

Metal Finishing Industries Hours and Wages During the middle of August 1943, the United States Department of Labor issued an analysis of hours and earnings in June 1943. Those of special interest to the metal finishing industries are as follows:

Industry	*Average Weekly Earnings*	*Average Weekly Hours*	*Average Hourly Earnings*
Tin cans and tinware	$36.94	44.6	$0.826
Stamped and enameled ware and galvanizing	43.96	46.7	0.937
Non-ferrous metals and their products	47.47	47.0	1.01
a. smelting and refining	45.77	45.6	1.014
b. clocks and watches	39.18	45.9	0.856
c. jewelry and jeweler's findings	39.26	45.5	0.849
d. silverware and plated ware	45.93	46.6	0.987
e. lighting equipment	45.39	46.1	0.986

New WPB Chemicals Form On August 2, 1943 the Chemicals Division of the WPB issued a revised version of Form PD-600, now designated as WPB-2945. The fundamental information required is the same, but the form is very much smaller. The old form is being withdrawn.

Nitric Acid Committee Appointed During the month of August the War Production Board appointed a Nitric Acid Producers' Industry Advisory Committee with Edmund Rowland as the Government presiding officer. Other members of the committee are: Mark Bradley, General Chemical Co., New York, N. Y.; Horace Burrough, Monsanto Chemical Co., Everett, Mass.; Emerson Davis, Detroit Chemical Works, Detroit, Mich.; Frank R. Dunn, Charles Lennig & Co., Philadelphia, Pa.; Lawrence J. Finnan, Jr., Hercules Powder Co., Wilmington, Del.; William F. Lux, Illinois Powder Manufacturing Co., St. Louis, Mo.; C. B. McCoy, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.; R. S. Roeller, Pennsylvania Salt Manufacturing Co., Philadelphia, Pa.; R. E. Wiley, American Cyanamid & Chemical Co., New York, N. Y.

Platinum Group Committee Appointed The members of the newly appointed Platinum Group Producers' and Distributors' Industry Advisory Committee are R. J. Lund of the WPB; Sydney Cohn, Sigmund Cohn & Co., New York, N. Y.; H. Whitehead, Baker & Co., Inc., Newark, N. J.; R. Bayes, American Platinum Works, Inc., Newark, N. J.; Marc S. Goldsmith, Goldsmith Brothers Smelting & Refining Co., Chicago, Ill.; S. H. Headland, Wildberg Brothers Smelting & Refining Co., San Francisco, Cal.; C. J. Johnson, Goodnews Bay Mining Co., Seattle, Wash.; W. C. Kerrigan, International Nickel Co., New York, N. Y.; Hugh Lehrfeld, Kastenhuber & Lehrfeld, New York, N. Y.; J. A. Samuel, J. A. Samuel & Co., New York, N. Y.; C. W. Stones, Johnson, Mathey & Co., Inc., New York, N. Y.

Priorities Regulation No. 13 Clarified Priorities Regulation No. 13 was revised on July 19, 1943 so that manufacturers and others may readily understand this regulation which controls special sales of industrial materials. The schedule attached to the regulation has been altered to provide that special sales of aluminum, copper and steel in controlled material forms may be made only to a person who can place an authorized controlled materials order for the item. This regulation applies to the sales of such metals as antimony, beryllium, brass mill and wire mill products, cadmium, chromium, cobalt, copper, lead, magnesium, nickel, terne plate, tin, and zinc, and such chemicals as acetic acid, sulfuric acid, acrylic resins, alcohols and denaturants, benzene, carbon tetrachloride, chlorine, chlorinated hydrocarbon solvents, cobalt oxide, copper chloride, shellac, and zinc sulphide pigments, and such other commodities as corundum, mica, aluminum paint, and rubber.

Pyridine Order Amended The WPB Pyridine Allocation Order M-185 was amended on June 29, 1943. No person shall use more than 80 pounds (10 gallons) of pyridine in a calendar month. If any person wishes to use more than 80 pounds of pyridine in one calendar month, he must file an application on Form WPB-2945. This order also provides that any person may accept delivery and use not more than 20 pounds (2½ gallons) of pyridine in a calendar month for experimental purposes without specific authorization. Suppliers seeking authorization to deliver pyridine must make application on Form WPB-2946.

Safety Equipment Price Ceilings The prices of such equipment as fire alarms, watchman boxes, burglar alarms, sprinkler systems, and similar devices used for the detection of, and for the protection against, loss or damage by fire, theft, burglary or sabotage of metal finishing plants are now subject to the price ceilings fixed in Amendment No. 26 to Maximum Price Regulation 165 and Amendment No. 32 to Revised Supplementary Regulation No. 11, both of which became effective August 10, 1943.

Safety Equipment Rating Extensions Directive No. 11 under CMP Regulation No. 5, issued on August 13, 1943, permits employees of businesses listed in Schedules I and II of CMP-5 to use their employers' MRO preference ratings to buy such safety equipment as protective rubber gloves, safety clothing resistant to acids and other chemicals or abrasives, gas masks, respirators, face and eye shields, goggles, and protective creams. Before employees are permitted to use their employers' preference ratings, they must first obtain from them certificates indicating the types and sizes of safety equipment required in the service of their employers.

Silver Inventories Required Because of the increasing need of silver for essential war industries, the WPB on August 13, 1943 asked for inventory reports from 1400 manufacturers whose stocks of this metal have been frozen by WPB restrictions. The inventory requires an on-hand listing of all idle foreign silver of .999 fineness, in bars, grain or clean scrap. The inventory report form includes in the term "foreign silver" all "silver and scrap resulting from the processing of silver which (1) was imported from mines, outside of the United States and its possessions, (2) was produced from mines in the United States and its possessions on or before July 1, 1939, and also (3) scrap resulting from the processing of silver taken from these mines since July 1, 1939, if it is no longer owned by the person whose processing operations produced it." Based on these reports owners may be asked to sell their idle inventories to authorized buyers. The price paid will be negotiated by buyer and seller, subject to the OPA ceiling of 45 cents an ounce.

Silver Products of Treasury Silver A change in date was made in Amendment No. 11 to Revised Supplementary Regulation No. 14 by the Office of Price Administration on July 30, 1943. The date upon which manufacturers of semi-fabricated silver products may charge the same prices for products made from Treasury silver sold under the Green Act, as for newly mined silver, was advanced from July 29, 1943 to August 2, 1943 because WPB Order M-199, as amended July 29, 1943, (which permitted the channeled Treasury silver for industrial consumer uses) became effective on July 29, 1943.

Silver Semi-Fabricated Product Prices The Green Act of July 12, 1943 provides that Treasury silver sold under the terms of the act cannot be less than 71.11 cents per fine troy ounce. Amendment No. 5 to Revised Supplementary Regulation No. 14 under General Maximum Price Regulation became effective August 2, 1943. Under this amendment manufacturers of semi-fabricated silver products such as machine bearings, gun mounts, photographic equipment, including such items as silver alloys, grain, shot, powder, wire, sheet, blanks, circles, solders, brazing alloys, sintered products, silver-clad metals, and silver inlays are authorized to charge the same prices for such products made of Treasury silver as of newly mined domestic silver. The maximum price for newly mined domestic silver is 71.11 cents per fine troy ounce.

Spain Increases Her Nickel Output The United States Department of Commerce has revealed that due to improved methods of production, Spain has increased her output of nickel from 207 tons in 1941 to 560 tons in 1943.

War Contract Cancellation Policy Will metal finishing War Department contractors (prime and subcontractors), be left to "hold the bag" on partially completed contracts if the war should come to a sudden end? On August 11, 1943 Major General C. L. Corbin, director of procurement, Office of the Quartermaster General, disclosed at the WPB Woolen and Worsted Manufacturers' Industry Advisory Committee meeting that the present policy of the War Department is "if goods to be made under a cancelled contract were in process of being manufactured, the goods would either be completed and purchased by the Government for ultimate disposal through other channels, or the contractor would be reimbursed for any loss suffered as a result of the cancellation." This seems to indicate that metal finishing firms will not suffer losses from cancelled contracts because it is not likely the War Department would be unfair by adopting a protective policy only for textile and clothing manufacturers.

SHOP PROBLEMS

PLATING AND FINISHING
POLISHING — BUFFING
CLEANING — PICKLING
HOT DIP FINISHES

METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Plating on Stainless Steel, Chromium and Dural—Passivation

Question: Can you tell me how to plate cadmium on stainless steel and also on Dural? Do you know of a method of plating chromium on Dural?

Another question of considerable importance to us concerns "passivation". What is the true meaning of "passivation of metals" and how does it affect metals as to their plating properties?—R. C. S.

Answer: A standard process for plating on stainless steel and chromium is to first deposit a thin deposit of nickel from the Wood solution by direct current treatment at six volts in a solution containing two pounds of nickel chloride and one pint of hydrochloric acid per gallon.

Dural may be plated by pre-treatment in one of the proprietary solutions, such as the Krome-Alume process or the Colonial Alloys process. Details on these may be obtained by communicating with the vendors.

In answer to your second question, we would advise that passivation, as the term suggests, is the formation of a passive protective film, generally of an adherent oxide, on metals so that corrosion of the surface is minimized. The film must be removed in order to obtain an adherent deposit.

Source of Adipic Acid

Question: We have a quantity of small nickel silver pieces which, after stamping, have to be annealed and pickled. We are pickling them in sulfuric acid which leaves them green. We have then been dipping them in a solution of nitric and sulfuric acids which cleans them quite well, but we are looking for a more satisfactory method.

We note on pp. 24-5 of your 1942 *Plating and Finishing Guidebook* a formula for bright dipping nickel silver. An ingredient is adipic acid. We have been unable to purchase this on the West Coast and would appreciate your letting us know where this acid may be obtained.—S. and Co.

Answer: Adipic acid can be purchased from Varlacoid Chemical Co., 116 Broad Street, New York, N. Y.

Electrolytic Pickling Process for Drawn Steel

Question: I am interested in receiving data on the electrolytic pickling process for drawn steel.—R. V. D.

Answer: There are many processes for electrolytic pickling using direct, reverse and alternating current. This is too large a subject to be covered by a letter but if you will be more specific as to the type of electrolytic pickling you are interested in, we shall be glad to furnish further details.

Early Data on Air Agitation

Question: Do you know whether and by whom air agitation in electroplating baths was used prior to 1932? We shall also appreciate data concerning agitation, cooling, and electrolyte circulation in use previous to 1932.

Answer: The easiest reference we can give you prior to 1932 is Blum and Hogaboom's *Principles of Electroplating and Electroforming* (Second Edition — 1930) which mentions the use of air agitation in acid copper solutions on page 93.

Agitation, cooling and electrolyte circulation are discussed by Langbein as early as 1893 in the second American edition of his book, *Electro-Deposition of Metals*, on pages 137-8.

Removal of Gold from Brass Trumpets

Question: We would sincerely appreciate it if you would let us know whether you have a solution for removing gold plate from brass trumpets. The solution must not pit the brass.—V. B. Corp.

Answer: Gold can be removed from brass or other copper alloys by making the article anodic in concentrated sulfuric acid containing 1 oz./gal. of either chromic acid or single nickel salts. This process has been patented by S. R. Mason (U. S. Pat. 2,185,858).

If the deposit is not heavy, it may be possible to remove the gold with reverse current in a solution of 8 oz./gal. of sodium cyanide at about 150° F. However, if the gold is very heavy, there may be some possibility of pitting the brass plate with this method.

Recovery of Cadmium from Cadmium Strip

Question: I should like to have information from you on the recovery of cadmium from cadmium strip. The strip is made up of one pound of ammonium nitrate and one gallon of water.—E. T.

Answer: The cadmium can be precipitated from this solution by making it strongly alkaline with caustic soda. This will decompose the ammonium nitrate driving off the ammonia and precipitating the cadmium as cadmium hydroxide which is a white mud.

If the cadmium hydroxide is washed completely free of nitrates, it can be returned to the plating solution. However, it must be remembered that the use of cadmium hydroxide or cadmium oxide instead of anodes for supplying the metal content of the solution will result in a large increase in the caustic soda content of the solution.

It might be better to send the cadmium hydroxide to a refiner for credit.

Color Obtained from Brass Solution

Question: We operate a brass solution to plate small metal stampings. We strive to obtain a dull brass finish but more often we obtain a gold color. We would appreciate your comments and advice as to what the pH should be to obtain the finish we desire.—O. M. Co., Ltd.

Answer: In obtaining a brassy color, pH is not the only controlling factor. It is also necessary to control the temperature, current density, free cyanide and metal content of such solutions as all these affect the color. We suggest that you have your solution analyzed and brought up to standard conditions.

Polishing and Buffing Machines

Question: Have you any technical articles on polishing and buffing machines for job work? We have a quantity of magnesium castings which must be polished all over. They are 26" in diameter, 8" deep and are filled with bosses and obstructions of all kinds. It takes much muscle and two hours to clean them with the usual portable rotary air motors and flexible shafts using steel burring wheels and buffs. —C. W. Corp.

Answer: We suggest that you communicate with manufacturers of polishing and buffing equipment such as those who advertise in *Metal Finishing*. For your further reference, we are forwarding, under separate cover, a copy of our *Buyers' Directory*, which lists such manufacturers and suppliers on page 104.

Dictionary of Metal Finishing Chemicals

Formaldehyde: HCHO. Mol. wt. 30.026. Sp. gr. 0.815. M. P. —92°C. B. P. —21°C. Colorless, pungent gas. Also known as Methanal, Oxomethane. Soluble in water, alcohol and ether. Sold commercially as a solution in water. See Formalin.

Formalin: A clear, colorless liquid with pungent odor. Solution of formaldehyde in water containing 38-40% of HCHO. Also known as Formic Aldehyde, Formol, Formalith, Formaldehyde. Grades: U. S. P., C. P. Containers: Bottles (1, 5 lb.); Jugs (1 gal.); Demijohns (16, 24, 40 lb.); Carboys (50, 100, 120 lb.); Drums (55 gal.); Kegs (125 lb.); Barrels (400-450 lb.); Tank Trucks; Tank Cars.

Formalith: See Formalin.

Formic Acid: HCOOH. Mol. wt. 46.026. Sp. gr. 1.220. M. P. 8.4°C. B. P. 100.7°C. Colorless liquid with pungent odor. Also known as Methanoic Acid. Infinitely soluble in water, alcohol, ether. Grades: Technical (85%, 90%); N. F. (25%, 75%); C. P. (50%, 90%). Containers: Bottles (1, 5 lb.; 1 gal.); Carboys (45, 120, 150, 195 lb.).

Formic Aldehyde: See Formalin.

Formol: See Formalin.

Formonitrile: See Hydrocyanic Acid.

Formyl Trichloride: See Chloroform.

Fossil Wax: See Ozokerite.

Fraude's Reagent: See Perchloric Acid.

French Chalk: See Talc.

Fuller's Earth: A type of clay relatively high in magnesia. Grades: Technical, Washed Powder, Washed and Ignited Powder; N. F. Powder. Containers: Cartons (1, 5 lb.); Bags (1, 10, 50, 80, 100, 200, 220, 230 lb.); Kegs (100 lb.); Barrels (200 lb.).

Fural: See Furfural.

2-Furaldehyde: See Furfural.

2-Furancarbonal: See Furfural.

2-Furancarbinol: See Furfuryl Alcohol.

This issue brings you the ninth installment of the dictionary of chemicals used in the finishing industry.

This feature will continue as a regular part of *Metal Finishing* until all related materials have been reviewed in alphabetical sequence.

Furfural: C_4H_3OCHO. Mol. wt. 96.082. Sp. gr. 1.1598. M. P. —38.7°C. B. P. 161.7°C. Colorless liquid with penetrating odor. Also known as 2-Furancarbonal, 2-Furaldehyde, Fural, Furfuraldehyde, Furfurole. Soluble in alcohol, ether, benzene. Solubility, 9 at 20°C. Grades: Technical, Purified. Containers: Bottles (1, 5 lb.); Drums (50 gal.); Tanks.

Furfuralcohol: See Furfuryl Alcohol.

Furfuraldehyde: See Furfural.

Furfurole: See Furfural.

Furfuryl Alcohol: $C_4H_3OCH_2OH$. Mol. wt. 98.098. Sp. gr. 1.1351. B. P. 170.2°C. Colorless liquid. Also known as Furyl Carbinol, 2-Furancarbinol, Furfuralcohol, Alphafurylcarbinol. Infinitely soluble in water, alcohol, ether. Forms insoluble resin with mineral acids. Grades: Technical, Purified. Containers: Bottles (1, 5 lb.); Drums (5, 10, 50 gal.); Tanks.

Furol: See Furfural.

Furyl Carbinol: See Furfuryl Alcohol.

Furyl Carbinol, Alpha: See Furfuryl Alcohol.

Galena: A natural form of Lead Sulfide, q. v.

Gallic Acid: $C_6H_2(OH)_3COOH{\cdot}H_2O$. Mol. wt. 188.134. Sp. gr. 1.694. M. P. 220°C. with decomposition. Colorless to slightly yellowish monoclinic needles. Also known as 3, 4, 5-Trihydroxybenzoic Acid. Solubility, 1.2 at 25°C. and 33 at 100°C. Soluble in alcohol and slightly soluble in ether. Grades: Technical, U. S. P., N. F., C. P. Containers: Cartons (1 lb.); Boxes (5, 10, 25, 50 lb.); Drums, Kegs (100 lb.); Barrels (140, 200 lb.).

Gallic Acid—3-Monogallate: See Tannic Acid.

Garnet: A silicate mineral of varying formula. Usually red, but may be all colors. Main constituent is silicate plus calcium, aluminum, magnesium, manganese, iron, chromium.

Gasoline: Also know as Motor Spirit, Petrol, Petroleum fraction ranging above 50°Be. Grades: According to gravity. Containers: Cans, Drums, Tanks.

Gelatin: A colloidal, nitrogenous protein. Pale yellowish powder, granules, sheets. Grades: Edible, Photo, Technical, U. S. P. Containers: Cartons (1, 5 lb.); Boxes; Cases (100 lb.); Bags (150 lb.); Barrels (250 lb.).

Gilder's Size: Glue in thin leaves or scales.

Gilder's Whiting: See Whiting.

Gilsonite: Very pure form of asphaltic group. See Bitumen.

Glass: Amorphous fused mixture of various silicates.

Glass, Liquid: See Sodium Silicate.

Glass Soluble: See Sodium Silicate.

Glass, Water: See Sodium Silicate.

Glauber's Salt: See Sodium Sulfate, Hydrated.

Glucinum: See Beryllium.

Glucose: A mixture of dextrose and dextrins with water. Yellow to brown colored thick syrup. Also known as Corn Syrup and Starch Syrup. Soluble in water. Grades: Technical, U. S. P. Containers: Bottles (1, 5 lb.); Cans (10 gal.); Drums (130 lb.); Barrels (50 gal.); Tanks.

Glue: An impure form of gelatin, q. v. used for adhesive purposes. Flakes, Granules, Bricks, Powder. Containers: Cartons (1, 5, 10, 25, 50 lb.); Boxes (50 lb.); Kegs, Drums (100 lb.); Barrels (225, 250, 260, 285 lb.).

Glycerin: See Glycerol.

Glycerol: $C_3H_5(OH)_3$. Mol. wt. 92.094. Sp. gr. 1.260. M. P. 17.9°C. B. P. 290°C. Viscous, colorless, odorless liquid with sweet taste. Also known as Glycerin 1, 2, 3 - Propanetriol, Glycyl Alcohol, Propenyl Alcohol. Infinitely soluble in water and alcohol. Insoluble in ether and chloroform. Grades: Technical—yellow distilled, Dynamite, U. S. P., C. P. Containers: Bottles (1, 5 lb.); Cans (10, 50 lb.); Kegs (25 lb.); Drums (550, 1100 lb.); Tanks.

Abbreviations: Mol. Wt. = Molecular Weight; Sp. gr. = Specific Gravity; M. P. = Melting Point; B. P. = Boiling Point; Solubility figures, where given, are parts by weight in 100 parts of water; Technical = Grade usually used for industrial purposes; Purified or Pure = Better grade than Technical; U. S. P. = Conforms to standards of U. S. Pharmacopoeia; C. P. = Chemically pure, exceeding requirements of the U. S. P.; N. F. = Meets requirements of the National Formulary.

Glycerol, Mineral: See Liquid Petrolatum.

Glycerol Stearate: See Stearin.

Glycerol Tristearate: See Stearin.

Glycyl Alcohol: See Glycerol.

Gold: Au. At. wt. 197.2. Sp. gr. 19.3. M. P. 1063°C. Cubic, yellow, ductile, malleable metal. Insoluble in water. Soluble in cyanide solutions and aqua regia. Insoluble in acids. Grades: Technical, Pure precipitated, Powder, Granular. Containers: Bottles (15 grain; ⅛, ¼, ½, 1 oz.); Bags; Boxes. Also various shapes.

Gold Chloride: $AuCl_3 \cdot 2H_2O$. Mol. wt. 339.6. Orange yellow or brown crystals. Also known as Auric Chloride, Gold Trichloride. Decomposes when heated. Soluble in water, hydrochloric acid, alcohol, ether. For common Gold Chloride of Commerce, see Chlorauric Acid. Grades: Technical, Purified, C. P. Containers: Ampules (15 grain); Glass Bottles (⅛, 1 oz.).

Gold Chloride: AuCl. Mol. wt. 232.7. Sp. gr. 7.4. Yellow crystals. Also known as Aurous Chloride. Decomposes to $AuCl_3$ when heated. Decomposes in water. Soluble in hydrochloric acid.

Gold Chloride—Acid: See Chlorauric Acid.

Gold Cyanide: AuCN. Mol. wt. 223.2. Sp. gr. 7.12. Light yellow, crystalline powder. Decomposes when heated. Almost insoluble in water. Soluble in cyanides and in ammonium hydroxide. Grades: Technical, C. P. Containers: Ampules (15 grain); Glass Bottles (⅛, 1 oz.).

Gold Hydrate: See Gold Hydroxide.

Gold Hydroxide: $Au(OH)_3$. Mol. wt. 248.22. Yellow brown powder. Insoluble in water. Soluble in hydrochloric acid, potassium cyanide and sodium cyanide. Sold commercially as Gold Hydrate which is a brown powder [Au(OH); Mol. wt. 230.21; 84½% gold]. Grades: Technical. Containers: Bottles (1, 2½, 5, 10, 50 oz.).

Gold Oxide: Au_2O_3. Mol. wt. 442.4. Brownish black powder. Insoluble in water. Soluble in hydrochloric acid. Grades: Technical, C. P. Containers: Bottles (15 grains; ⅛, 1 oz.).

Gold Potassium Chloride: See Potassium Gold Chloride.

Gold Potassium Cyanide: See Potassium Gold Cyanide.

Gold Size: Mixture containing about 13.3% copal varnish, 6.7% yellow ocher, 26.7% turpentine, 53.3% boiled linseed oil.

Gold Sodium Chloride: See Sodium Gold Chloride.

Gold Sodium Cyanide: See Sodium Gold Cyanide.

Gold Tin Purple: See Purple of Cassius.

Grain Alcohol: See Ethyl Alcohol.

Grape Sugar: See Dextrose.

Graphite: A soft crystalline form of carbon. Sp. gr. 2.09-2.25. Steel gray to black powder or metallic plates. Also known as Black Lead, Plumbago, Mineral Carbon. Insoluble. Grades: Technical. Containers: Cartons (1, 5 lb.); Cans (1, 5, 10 lb.); Boxes (25, 100 lb.); Barrels.

Graphite, Retort: See Carbon, Gas.

Green Soap: See Soap, Soft.

Green Verdigris: See Copper Acetate, Basic.

Green Vitriol: See Ferrous Sulfate.

Gum: See various types such as Arabic, Tragacanth, etc.

Gum, Artificial: See Dextrin.

Gum, British: See Dextrin.

Gum Lac: See Shellac.

Gum Spirits: See Turpentine Oil.

Gum Starch: See Dextrin.

Gum Vegetable: See Dextrin.

Gutta Percha: Coagulated sap of various tropical trees. M. P. 120°C. Yellow to grayish yellow lumps, chips, sheets, sticks. Leathery and hard. Slightly soluble in carbon disulfide, chloroform and benzene. Grades: Technical. Containers: Cans (1, 5 lb.); Bags.

Gypsum: A natural form of calcium sulfate, $CaSO_4 \cdot 2H_2O$, q. v.

Halogens: Group of elements consisting of bromine, chlorine, fluorine and iodine.

Hartshorn: See Ammonium Carbonate.

Hartshorn, Spirits of: Solution of ammonia, q. v.

Hematite: See Ferric Oxide, Red.

Hexadecanoic Acid: See Palmitic Acid.

Hydriodic Acid: HI. Mol. wt. 127.93. Sp. gr. 4.48. M. P. —50.8°C. B. P. —35.4°C. Colorless gas or pale yellow liquid when dissolved in water. Also known as Hydrogen Iodide. Very soluble in water. Soluble in alcohol. Grades: Technical; Purified (Sp. gr. 1.5, 1.7, 1.96); U. S. P.—10% (Sp. gr. 1.07); C. P.—40% (Sp. gr. 1.38); 48% (Sp. gr. 1.49). Containers: Bottles (1, 5 lb.); Carboys (U. S. P.—100 lb.; 150 lb.).

Hydrobromic Acid: HBr. Mol. wt. 80.924. Sp. gr. 2.82. M. P. —88.5°C. B. P. —67°C. Colorless gas or pale yellow liquid when dissolved in water. Also known as Hydrogen Bromide. Solubility, 221 at 0°C. and 130 at 100°C. Soluble in alcohol. Grades: Technical, Purified, U. S. P., C. P. (48%); Containers: Bottles (1, 5 lb.); Carboys (100, 125, 150 lb.).

Hydrochloric Acid: HCl. Mol. wt. 36.465. Sp. gr. 1.27. M. P. —112°C. B. P. —83.7°C. Colorless gas or colorless to yellowish liquid when dissolved in water. Also known as Hydrogen Chloride, Muriatic Acid, Chlorhydric Acid. Solubility, 82.3 at 0°C. and 56 at 60°C. Slightly soluble in alcohol. Grades: (All water solutions) Technical, 18°, 20°, 22°, U. S. P., C. P.—(Sp. gr. 1.18-1.19). Containers: Bottles (1, 6 lb.); Carboys (110-125 lb.); Rubber-lined Drums (55 gal.); 7-ton Tank Trucks; Tank Cars (12-25 tons).

Hydrocyanic Acid: HCN. Mol. wt. 27.026. Sp. gr. 0.699. M. P. —15°C. B. P. 26°C. Colorless gas or liquid. Extremely poisonous. Also known as Hydrogen Cyanide, Prussic Acid, Formonitrile. Soluble in water and alcohol. Grades: Technical (solution); U. S. P. (2%, 5% solution); Liquefied gas. Containers: Bottles (1, 5 lb.); Steel Cylinders.

Hydrofluoboric Acid: HBF_4. Mol. wt. 87.83. Colorless liquid. Also known as Fluoboric Acid. Decomposes when heated above 130°C. Infinitely soluble in water and in alcohol. Grades: Technical. Containers: Bottles (10 lb.); Carboys (5, 12 gal.); Rubber Drums (100 lb.).

Hydrofluoric Acid: HF. Mol. wt. 20.01. Sp. gr. 0.712. M. P. —92.3°C. B. P. 19.4°C. Colorless gas or colorless, fuming, highly corrosive liquid. Also known as Hydrogen Fluoride, Fluohydric Acid. Very soluble in water. Grades: (All water solutions) Technical (30%, 40%, 48%, 52%, 55%, 60% solution); C. P. (48%). Containers: Wax Bottles (1 lb.); Jugs (1 gal.); Lead Jars (5, 10, 20 lb); Lead Carboys (10 gal.); Barrels (50 gal.); Rubber Drums (85-115 lb.); Steel Drums.

(To be continued next month)

Abbreviations: Mol. Wt. = Molecular Weight; Sp. gr. = Specific Gravity; M. P. = Melting Point; B. P. = Boiling Point; Solubility figures, where given, are parts by weight in 100 parts of water; Technical = Grade usually used for industrial purposes; Purified or Pure = Better grade than Technical; U. S. P. = Conforms to standards of U. S. Pharmacopoeia; C. P. = Chemically pure, exceeding requirements of the U. S. P.; N. F. = Meets requirements of the National Formulary.

NEW EQUIPMENT AND SUPPLIES

NEW PROCESSES, MATERIALS AND EQUIPMENT FOR THE METAL INDUSTRY

Polishing Machine

Lewis Roe Manufacturing Co., Dept. MF, 1042-1050 De Kalb Ave., Brooklyn, N. Y., has announced a new polishing machine designed for light buffing and coloring work. The machine is driven by a ¼ h.p., alternating or direct current, driving motor mounted on the stand.

It is equipped with two self-aligning, ball bearing pillow blocks and has a ¾" diameter spindle 22" long. Longer spindles can be furnished if required. The spindles are turned down at the ends to the diameter of ½" and threaded eight square threads to the inch. The spindle is tapped for taper points which are furnished with the machine.

A switch, eight feet of cord, a V belt and a device for keeping the belt at a uniform tension are also furnished. The machine weighs about 100 lb.

Automatic Machined Parts Cleaner-Washer

M. Dysthe, Dept. MF, 3048 Twelfth Ave., So., Minneapolis, Minn., is designing and manufacturing an automatic three-stage cleaning and washing machine which delivers parts cleaned, separated and ready for weigh-counting.

Parts are started from a tray at the upper left. They are then raked down a chute into a tubular tapered wire screen drum to the first cleaning bath. Traveling on a flat, smooth surface, they move on a screw incline through the cleaning solution. At the center of the tank, they slide automatically into the rinsing solution. They are then moved through the rinsing bath and delivered to the chute which carries them to the scale for weigh-counting.

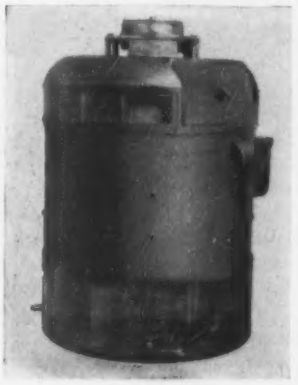
All moving parts turn on a single shaft operated by a ½ h.p. motor.

Identification Badge

Stanley A. Tompkins Laboratories, Somerville, N. J., has announced a plastic identification badge designed to fill the need of smaller concerns that cannot afford to make up special dies for metal badges and the cost of the closure machines for putting them together.

The badge consists of two pieces, a molded plastic lens with a thick supporting ring as an integral part and a back which fits tightly into the ring and in which a pin is mounted.

By tacking the front and back pieces together with a soldering iron in about three places, they may be opened and reused when an employee leaves.



New Line of D-C Vertical Motors

A new line of direct-current vertical motors ranging from 40 to 200 h.p. at 1750 r.p.m., and in equivalent ratings at other speeds, has been announced by the General Electric Co., Dept. MF, Schenectady, N. Y. The new motors, which are furnished for both constant and adjustable speeds, are designed for low-thrust, solid-shaft applications on pumps, machine tools, and marine underdeck auxiliaries. They are also recommended in cases where valuable floor space must be saved or the expense of gearing avoided.

The motors are of drip-proof, protected construction, and are claimed to provide complete protection from dripping liquids and falling objects. Convenient fittings on both the upper and lower bearings simplify lubrication, and provision for the escape of excessive grease reduces the possibility of over-lubrication. A special bearing housing is designed to prevent grease from entering the motor and damaging the commutator and the windings.

The cast-iron conduit box is roomy and can be arranged for bringing the leads in at the top, bottom, or either side. Two hand-hole covers, removable without the use of tools, permit inspection of the commutator end brushes. The ring-type base has an accurately machined rabbet and jig-drilled mounting holes, thus assuring permanent alignment with the driven machine. Sturdy lifting lugs facilitate installation.

Salt Tablets in Handy New Package

Standard Safety Equipment Co., Dept. MF, 232 West Ontario St., Chicago, Ill., has announced its marketing of Fairway ten-grain heat tablets in a vest pocket size, dust-tight package.

The package holds 24 tablets and can be opened and closed in one hand for single tablet delivery. It is especially recommended for efficient distribution among small, isolated groups.

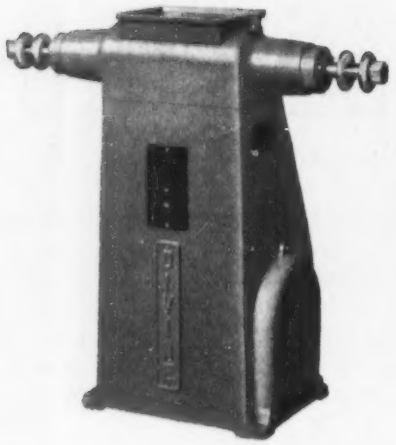
"Infra-Red Principle" Gas Burners

Burdett Manufacturing Co., Dept. MF, 19 North Loomis St., Chicago, Ill., is manufacturing a gas burner which is essentially a thermal radiator whose temperature is maintained by the combustion of an air-gas mixture on the radiating surface itself.

Its usual operating temperature is 2300° F. About 99 per cent of its total radiation is in the form of infra-red rays. The energy is really heat (molecular motion) only at the place where it originates and at the place where it is received or absorbed. In between, it is radiation—a stream of energy—which goes on without loss or hindrance. Heat rays emanate at a 45° angle from the burner with perfect distribution void of focal or hot spots, thus providing an even temperature across the entire expanse or radiation, it is said.

Further details are included in a new 16-page catalogue offered by the company without obligation.

Professional Directory



New Lathe for Small Parts Finishing

Designed especially for small parts finishing, buffing and burring, the new lathe pictured above is being manufactured by Divine Brothers Co., Inc., Dept. MF, Utica, N. Y.

The unit, designated as VJ, is available in sizes from 1-3 h.p. with spindle speed up to 3,850 r.p.m.

The bearings are sealed and the ball bearing motor is enclosed in the base.

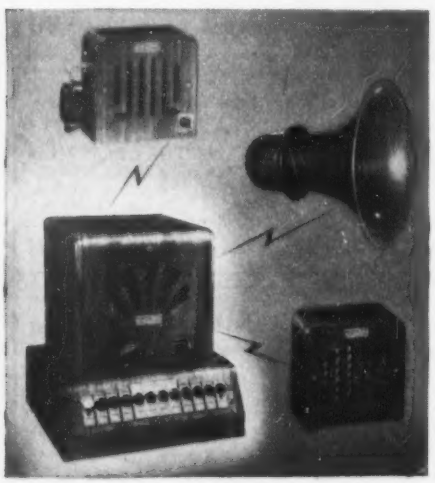
Ample room is provided between the wheels and the base as well as a large tray, a spindle lock and square threads on the spindle. One end of the spindle is tapped standard for taper points.

A high spindle speed is necessary with small buffs and bobs to get the correct number of surface feet per minute.

Optional features are a two-step drive and stop-start lever brake control of the motor.

Communication System with New Annunciator Selector

The central control master station shown is equipped with an annunciator selector having a buzzer and name tabs which illuminate to identify incoming calls. Built into a detachable base which can be replaced with larger-capacity selectors for future expansion, this new unit enables the user to talk individually to up to eleven other remote stations in the system, or page them all simultaneously. Likewise any other station in the system can signal and register its call on the master station's annunciator selector.



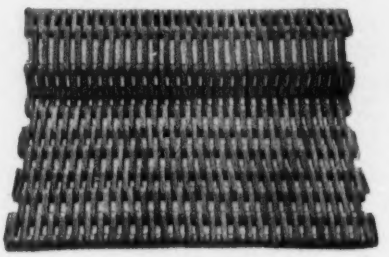
Each of the eleven name tabs lights up to identify the incoming calls and remains illuminated until each call has been received. A manual buzzer, which sounds to signal that another station is calling, can be cut off during conversations by flipping a toggle switch.

This special selector unit is also provided with a tone signal controlled by a lever on the side of the cabinet. This signal, which can be transmitted selectively or simultaneously to all other stations in the system, serves as an alarm, dismissal signal, or method of calling other stations by tone instead of voice. The single cable leading from the back of the cabinet is permanently attached to a handy terminal box assuring neat and simplified connections for wiring lines.

The top portion of this master station is the company's Model KC amplifier which delivers up to four watts of audible sound output. It incorporates a sensitive microphone speaker which transmits two-way conversation.

The two-way loud speaker trumpet and substations, also illustrated, are among more than 46 communicating models produced by this firm for varied intercommunication requirements.

Manufactured by Executone, Inc., Dept. MF, 415 Lexington Avenue, New York, N. Y. Delivery, on priority basis, is said to require from two to three weeks.



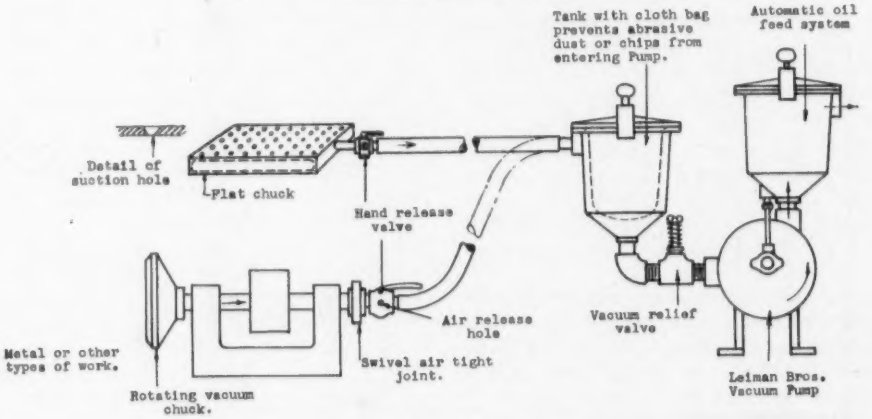
Safety Mats

Industrial Products Co., Dept. MF, 2820 N. Fourth St., Philadelphia 33, Pa., are manufacturing floor mats of scrap rubber composition links held in place with heavy wire rods.

The mats are described as practical for use in front of metal, wood working and other machines where there is not an excessive amount of oil. They are recommended for workers who must stand throughout the day because they relieve foot soreness, and leg, back and body strains.

Four sizes are available—the smallest 14″ x 21″; the largest, 30″ x 48″.

Suction Chucking Speeds Grinding



A strong suction of air is utilized in this idea to take the place of mechanical or magnetic chucking to hold articles to be ground, polished, beveled or otherwise worked upon.

The article to be held may be of any material—metal, glass, plastic, wood, etc., as long as it has a reasonably flat surface so that the suction or vacuum may have an area upon which to exert its pulling or holding strength.

A hollowed out flat chuck may be used in most cases having a connection for the air suction and a series of countersunk holes in the surface for holding purposes.

In using this chuck all holes in excess of those actually required for holding the article may be covered with a sheet of cardboard or paper.

Any degree of holding strength may be secured according to the weight of the article to be worked upon and in accordance with the strain exerted by the grinding, polishing or other operation.

For lathe work a rotating vacuum chuck may be used and this may be of the open type or of the flat perforated type, as desired.

In using the rotating chuck, an airtight swivel joint may be used on the pipe connection to the source of the vacuum or suction.

Full information may be secured from Leiman Bros., Inc., XD-125 Christie St., Newark, N. J., who furnish the vacuum outfit necessary to effectively operate this system of rapid chucking which, it is claimed, may be used in almost every line of manufacture and for every sort of material or article.

The size and weight of the article to be chucked as well as the type of operation to be performed should be stated.

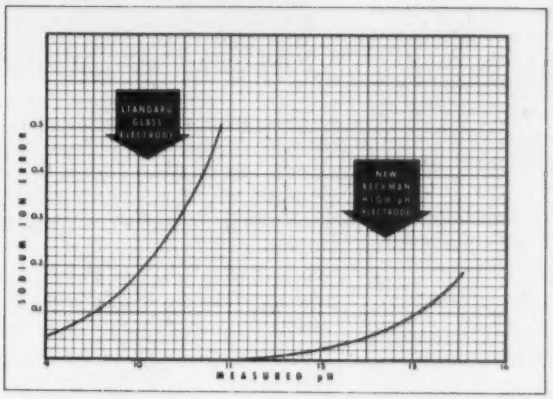
BECKMAN pH NOTES

BETTER PLATING THROUGH MODERN pH CONTROL

NO. 4 OF A SERIES

Showing how pH affects plating of brass, cadmium, zinc, copper and similar metals.

HOW THE BECKMAN "TYPE E" ELECTRODE IMPROVES MODERN PLATING EFFICIENCIES



THE ABOVE CHART shows the accuracy of the Beckman "Type E" Electrode as compared with conventional glass electrode when operating in highly alkaline baths where sodium ions are present. Note how the conventional glass electrode becomes increasingly inaccurate at even relatively low alkaline values, becoming useless at pH values above 11.

In contrast, the Beckman "Type E" Electrode requires no correction whatever at pH 11 and only very small correction at values as high as 13.5 pH!

No other make or type of glass electrode pH equipment has this vital advancement so important to modern high speed plating processes!

THE glass electrode is universally recognized as the most accurate and convenient method of controlling pH in process solutions. But in many alkaline plating baths—particularly cyanide baths for brass, copper, cadmium and zinc plating—operators were unable to use conventional glass electrode equipment to full advantage because of the excessive correction factors necessary.

Then the Beckman research staff made an important development—the Beckman "Type E" Glass Electrode—an electrode that can be used in highly alkaline solutions, *even in the presence of sodium ions*, with little or no correction necessary.

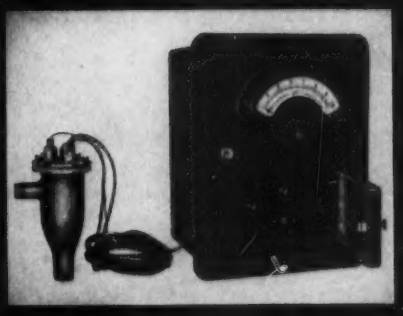
This electrode has been described by recognized plating authorities as "the first practical and accurate method for pH control of cyanide plating baths." With it more uniform deposits can be obtained—at higher plating speeds—with fewer rejects!

Whether your plating operations are on a small or large scale, investigate the vital savings in time and material that you can make with Beckman pH Control. There's a Beckman pH instrument to fit *your* requirements. Write for detailed information!

SEND FOR THIS FREE BOOKLET

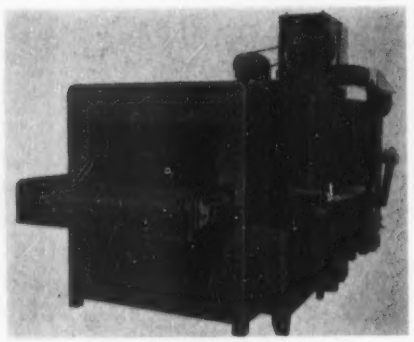
"What Every Executive Should Know About pH" . . . an interesting, informative booklet on the fundamentals of modern pH control. Ask also for Bulletin 86 which lists and describes Beckman instruments, electrodes and accessories!

BECKMAN PRECISION INSTRUMENTS
NATIONAL TECHNICAL LABORATORIES
South Pasadena California



THE BECKMAN AUTOMATIC pH INDICATOR is the most advanced pH instrument available for large-scale plating operations. Automatically indicates, records, and controls. *Ask for Bulletin 16!*

THE BECKMAN INDUSTRIAL pH METER is ideal for portable plant and field use in the electro-plating plant. Highly accurate, simple to operate, ruggedly built. *Ask for Bulletin 21!*



Cleaning Machine for Airplane Castings

Somewhat similar to the company's standard-type equipment for cleaning small metal parts, this Alvey-Ferguson metal products cleaning machine was especially constructed to speed-wash, rinse and dry miscellaneous airplane castings up to 17 x 36 inches in size with high-speed efficiency.

It is equipped with 36-in. wire mesh conveyor and combination skim box, drain and overflow. The fan-shaped spray is said to have a high co-efficiency of cutting action. The pumps and nozzles are protected by screen tanks with removable screens. Other features include parallel welded steam coils; unit model pump with no flexible couplings or sub-bases; marine-type clean-out and inspection doors, requiring no tools for operation; gear head conveyor motor; shear pin hub conveyor drives; spring loaded conveyor take-ups and solution thermometer. Tanks and chambers are constructed entirely of ¼" plate.

For full details write The Alvey-Ferguson Co., 694 Disney St., Cincinnati 9, Ohio.

Oil Absorbent and Floor Cleaner

A new oil and grease absorbent and floor cleaner, to be marketed under the name "Absorbo," has been developed by the Fidelity Chemical Products Corp., Dept. MF, 430 Riverside Ave., Newark, N. J., manufacturer of specialized cleaning compounds and detergents. The product is listed by the Underwriters' Laboratories, Inc., as a Class 1 non-combustible absorbent "for reducing fire and slipping hazards and for cleaning floors."

Though granular in form, it is claimed that Absorbo is non-abrasive and will not damage machinery or working parts due to abrasive action. It is also odorless, non-poisonous, and non-injurious to skin, clothing, or flooring, according to the manufacturer, and may be spread by hand and used on any type of floor surface, absorbing up to 45-50% of oil or grease by weight.

The product is being introduced in 50-pound bags. Samples, descriptive literature and copies of the Underwriters' Laboratories report are available on request to the manufacturer.

Aid to Small Part Grinding

One of the latest developments for speedier and more accurate surfacing of discs, squares and other small parts is the "In-Out Feed" table, manufactured by the Porter-Cable Machine Co., Dept. MF, Syracuse, N. Y. This accessory is for use with the company's G-4 belt type grinder.

It consists of two tables, one at each side of the belt and both adjustable to the grit level, which enable the stock to be fed to and received from the belt on a perfectly flat plane, thus avoiding the danger of nicking or grinding out of parallel.

In addition, there is a rail which holds the stock against the pressure of the belt and also is adjustable. It can be set at the correct angle to control the amount of grinding within micrometric tolerances, it is claimed.

Attached to a wet belt grinder, it is dustless and protects against burned or abrased hands.

It is often equipped with hopper and infeed and out-feed chutes for semi-automatic operation.

Announcing

IRIDITE

The New, Super-thin, easy-to-apply coating that protects zinc and cadmium surfaces against corrosion

Here is a new chemical coating that is unusually simple in application and low in cost. When *Iridite* is applied it is "soaked up" by the plated metal . . . becomes integral with it. That's why *Iridite* cannot chip or flake off.

Caused by a chemical reaction with the metal itself, *Iridite* is uniform, opaque and olive drab in color . . . matching the familiar shade used by the armed forces for camouflage.

Although *Iridite* gives remarkable protection against corrosion from all ordinary means, it is so thin that it does not "pile up" to alter the dimensions of the part. Delicately machined and closely articulated parts can be protected by *Iridite* without affecting their use or operation. In addition, after it has been applied the flexibility of *Iridite* permits parts to be bent, twisted, or formed without chipping, flaking or affecting the protective qualities of the *Iridite* coating.

The *Iridite* process greatly increases the field of usefulness of zinc and cadmium as protective coatings.

HOW IRIDITE IS USED

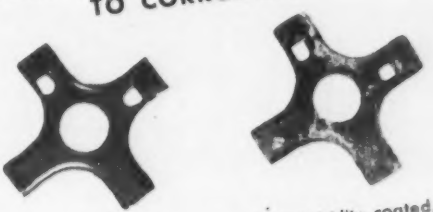
Plated parts are protected by the *Iridite* process by simply dipping them in the *Iridite* solution from 10 to 60 seconds, and rinsing in hot water immediately afterwards. Hot water is preferred in order to facilitate drying. The drying of the water from the part may be done by compressed air or by whatever other means are available. As soon as the part is dry it can be handled and shipped.

The only equipment needed are an acid-proof container for *Iridite* solution and a container for the hot water rinse. The *Iridite* solution is used at a temperature of from 75° to 100° F. depending on individual requirements.

The *Iridite* process can be applied to plated parts of any type or size, except in containers for edible products.

If you manufacture parts that are exposed to weather or to corrosion (except containers for food), you should send, immediately, for full details on the *Iridite* process. Better still, send us a part for *Iridite* coating, and test it any way you like. And, if your proposed use of *Iridite* requires an inspection of your production lines, our technical representative is at your service.

PROOF OF IRIDITE'S RESISTANCE TO CORROSION



Part at left was zinc plated and Iridite coated, then subjected to intermittent dip in warm 4% salt water solution for 220 hrs. No corrosion. Under identical conditions zinc plated part at right, without Iridite protection, shows heavy corrosion.

RHEEM RESEARCH PRODUCTS, INC.

Subsidiary of RHEEM MANUFACTURING CO., 1209 E. 25th St., Baltimore, Md.

The "Iridite" Process

A new method of protecting zinc and cadmium surfaces against corrosion through the application of a new coating, Iridite, has been developed by scientists of Rheem Research Products, Inc., Dept. MF, Baltimore, Md., a subsidiary of the Rheem Manufacturing Co.

Iridite, an opaque chemical coating, is simple to use and low in cost. According to the company's scientific staff, the material is literally "soaked up" by the plated metal, becoming an integral part of it. It will not flake off or chip, it is said.

For many years the Rheem company has been interested in the development of protective coatings. About three years ago, their research activities in this field became intensified, being specifically directed toward the development of a lasting protective coating for their hot water heaters—to assure a longer life by prevention of rust and corrosion. Thousands of chemical reactions were checked and tested. Finally, five months ago, a chemical process, now called "Iridite," was discovered. It was tested and found to be satisfactory.

Soon after it was developed, Rheem scientists, taking note of the fact that it provides an olive drab color very similar to that used by the armed forces, made tests to determine whether or not Iridite could be applied to weapons of war—such as hand grenades and shell casings. The results were considered satisfactory. It is claimed the use of the material makes unnecessary the painting of such weapons of war to guard against sun reflection.

According to the company's laboratories, Iridite will greatly increase the fields of usefulness of zinc and cadmium as protective coatings, making possible their use both for plating and for solid parts under exposure conditions which have not been possible in the past.

The protective skin provided by Iridite is said to be so thin it does not "pile up" to alter the dimensions of the parts to which it is applied to any extent that can be detected by ordinary measuring devices. It is also claimed that bending, forming and twisting do not impair the coating. Under ordinary conditions 100 gallons of the solution will coat 20,000 square feet of work.

Plated parts are treated with the process by dipping them in a proper solution for from 10-60 seconds and immediately rinsing in hot water. A hot water rinse is recommended to facilitate drying. As soon as a part is dry it can be handled for shipping.

The only equipment needed for applying the coating is an acid-proof container for the solution and a container for the hot water rinse. A temperature of from 75-100° F. is used, the exact temperature depending upon the work to be done. The manufacturers caution against using Iridite to protect containers for edible products.

As supplied, the solutions (designated as Solutions A and B) are four times normal concentration, water being added to bring them to usable strength.

Material treated with the chemical may be dried in a variety of ways, air dried, blown dry with compressed air or put through a drying oven, depending upon production requirements and the type of finished material.

It is essential that the material to be treated by the process have clean surfaces with all grease or alkali removed since the coating is applied through a chemical reaction. The texture and luster of the final finish is dependent upon the appearance of the material before application. Dull metal acquires a lusterless finish while a buffed or polished surface will have a satin-like finish.

New Rust Preventive

A new hard drying rust preventive providing a glossy, dry, thin film, is announced by E. F. Houghton & Co., Dept MF, 303 West Lehigh Ave., Philadelphia, Pa. This product, known as Rust Veto 110A is a light, amber-colored liquid applied by brush or spray. It dries in 25-30 minutes to a transparent film which is said to be hard yet flexible at temperatures as low as minus 70° F.

Thickness of the film approximates 0.0003" The flash point of the material is 110° F.

When dry, the coating is inflammable. It is claimed to have excellent adhesion to metal, even after being subjected to soaking in water for 24 hours.

The manufacturer will supply full information and prices upon request.

Manufacturers' Literature

Pipe Fabrication

An illustrated 64-page book dealing with pipe fabrication has been issued by the *Flori Pipe Co.*, Dept. W-4, St. Louis, Mo. It covers the various ways in which piping can be used and lists present market prices for every kind and size of fabricated piping.

Industrial Apparel

Aldine Paper Co., Industrial Sales Division, Dept. MF, 373 Fourth Ave., New York, N. Y., has published an illustrated folder entitled "Heat Slows Work." This literature deals with the company's line of sweat bands, dust masks and caps.

Rotary Finishing Machine Bulletin

Bulletin No. 401, describing Hammond Rotary Table Automatics, has been announced by *Hammond Machinery Builders, Inc.*, Dept. MF, 1601 Douglas Ave., Kalamazoo 54F, Mich.

The key to efficient automatic finishing is described in this new eight-page, illustrated bulletin which shows Hammond high-production 6 and 8 (work-holding) spindle rotary table automatics. Detailed information, shown photographically, gives various combinations of relatively standard units and their flexibility in adjustment of heads, table speeds, and work-holding chucks which makes them adaptable to a wide variety of parts to be deburred, brushed, polished or buffed.

Construction features are clearly given, and a complete table of specifications is tabulated for ready reference.

Surface Preparation Prior to Zinc Coatings

Today's widespread use of bright zinc, in place of increasingly scarce cadmium for plating ordnance materiel and other vital war supplies, emphasizes the importance of proper surface preparation before application of protective zinc coatings. To help plating departments and contract finishing shops speed-up this work and minimize or eliminate rejects, a new, six-page Special Service Report, containing data on successfully used metal degreasing techniques and procedures, has been issued by *Oakite Products, Inc.*, Dept. MF, 18 Thames St., New York, N. Y.

This report concisely reviews still tank and cathodic cleaning as well as anodic degreasing for removing smut, dirt, grease, quenching oils, cutting oils, drawing and stamping compounds and other accumulations from metal surfaces. In addition, it includes data on pre-soaking techniques, to be used whenever required, that aid in securing chemically clean surfaces.

Helpful tips and suggestions are also given on the use of pickling treatments and acid baths for removing oxide, scale and rust.

Free copies of this informative report are available on request.

Buying Data

New simplified buying data in bound and loose-leaf form for quicker selection, easier ordering and quicker delivery, have been announced by *Westinghouse Electric and Manufacturing Co.* Buyers of Motor and Control may secure copies from the company's district offices only—no mailings will be made from the Westinghouse headquarters at East Pittsburgh.

Bound books contain prices, dimensions, application data and descriptions. The 180-page "Motor Buying Data" covers popular types and ratings of motors (up to 100 h.p.), gear motors, and M-G sets. "Control Buying Data" (276 pages) lists a wide variety of controls and accessories for d-c, single-phase, squirrel cage and wound rotor motors.

For the use of large-scale purchasers, the motor and control loose-leaf book contains complete product listings, plus information on special features required for specific industries. Pricing data are always kept up to date by the issuance of new price supplements.

Arranged to fit buyers' needs and eliminate selection errors, the new books include only pertinent buying data. Special features are the new index system for quick product selection, and the directory of standard equipment designed to eliminate need for specially built motors and control.

New Books

A Course in Powder Metallurgy. By Walter J. Baëza. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y. 212 pp. Price: $3.50.

Metal powders can be compressed in molds and then sintered to bind the particles to produce alloys not obtainable by fusion, such as tungsten carbide cutting tools, welding rods, porous oil-holding metal for bearings, electrical contacts, and special parts such as gears. The tungsten wire used in incandescent light bulbs was one of the first products made on a large scale starting with a metal powder.

This book briefly describes the above, and other products, and then goes in to methods of producing, classifying, and washing the powders. Fifteen laboratory experiments are given.

Henley's Twentieth Century Book of Formulas, Processes and Trade Secrets. Edited by Gardner D. Hiscox. Revised Edition. Published by The Norman W. Henley Publishing Co., 17 West 45th St., New York, N. Y. 1942. 861 pp. and index. Price $4.00. This volume, which is stated to contain almost 10,000 formulas, processes and trade secrets, would not be consulted for plating solution formulas by a plater, since those formulas which are given probably date back to the last century. However, there is a wealth of information available on a great number of subjects and metal finishers will undoubtedly have occasion to make use of this book for help on problems not directly connected with their daily work, but which are saddled upon them by other departments because of their supposed familiarity with chemicals. There is a section on paints and lacquers and the subjects covered run from acid-proof cement to cleaning zinc plates, all very thoroughly indexed.

Industrial Chemistry of Colloidal and Amorphous Materials. By W. K. Lewis, L. Squires and G. Broughton. Published by The Macmillan Co., 60 Fifth Ave., New York, N. Y. First Edition. 1942. 540 pp. Price $6.00.

Those interested in the technical aspects of electrodeposition will find many chapters of interest in this book. In a style that is almost breezy, except where formulas are derived and stilted forms are used, the authors explain such matters as the structure of liquids, viscosity, surface tension and orientation, adsorption, and the electrochemical behavior of colloids. All these have a direct bearing on electrodeposition although this subject is not specifically mentioned.

The book is not an elementary text. A knowledge of physics and chemistry is necessary to get full value from it. However, there is enough material on the explanation of usually poorly understood phenomena to make the book a valuable aid.

The Microscope and Its Uses. By F. F. Munoz and H. A. Charipper. Published by Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y. 1943. 290 pp., plus glossary, bibliography and index. Price $2.50.

One of the authors is identified as a professor of biology and it is therefore to be expected that the metallurgical microscope, which is the type generally employed in the metal finishing industry, would not be treated extensively. Despite this drawback, the book fills the definite need which has existed for a guide more complete than the usual pamphlets supplied by microscope manufacturers and less technical and involved than a textbook.

The average microscope user knows very little about the instrument and a non-technical book of this type, which eliminates the subject of "optics" and concerns itself mainly with a description of the various microscopes and accessories, together with their proper use and maintenance, will be referred to often enough to make it a worthwhile addition to the library of the owner or user of a microscope. The last chapter, which lists 36 common errors in the use of microscopes with a brief description of each, is of particular interest.

News from California
By FRED A. HERR

Metal Work Shop, 1620 Euclid Ave., Pasadena, Calif., is engaged in a building alteration program involving a cost of several hundred dollars.

Metal Polishing Co. is enlarging its plant at 804 East Florence Ave., Los Angeles, with a new one-story addition, 20 x 20 feet in dimension.

Plans are being prepared for the construction of a reduction plant by *Lewis F. Johnson* of Auburn, Calif., to supplement facilities at his Lakeview, Calif., copper mine, six miles east of Auburn.

Cannon Electric Development Co., 3209 Humboldt St., Los Angeles, now has its schedule geared 98% to war production. To expand its sales, engineering and executive personnel to meet the growing needs of this defense program, *Robert Cannon*, general manager, has moved up sales manager *Douglas H. Loukota* to the position of director of sales and new development. *William V. Brainard*, the firm's Northern California representative, succeeded Loukota as sales manager.

Cannon Electric Development Co. produces a tremendous volume of electrical connectors for aircraft, tanks, radio, sound and general power applications. For the finishing of these items it operates one of the largest plating and finishing shops in Southern California, with batteries of large-sized tanks to accommodate big control panels, and the like.

Carroll McLaren has been plating superintendent for the Cannon Co. for a number of years. He ranks among the more progressive of the younger members of the metal finishing industry in Southern California, and despite the pressure of war work has managed to remain active in the affairs of the American Electroplaters' Society, serving now in his second year as secretary-treasurer of the Los Angeles Branch, A.E.S.

Kurt W. Renson

Kurt W. Renson, industrial chemist, has joined the Los Angeles laboratory staff of *Turco Products, Inc.*

Renson is a member of the American Chemical Society and was graduated in 1930 from the College of Industrial Chemistry in Vienna.

S. G. Thornbury, president and director of research of Turco Products, Inc., 6135 So. Central Ave., Los Angeles, has announced the appointment of *Ernest A. Long* as head of the control materials department of the Turco laboratory in Chicago.

Before being transferred to Chicago, Long specialized in aircraft and allied industries research at the Los Angeles laboratory of the company. Since wartime demands for high-speed efficiency in mass production has placed great stress upon chemical processes for metals, Long, who is now in complete charge of the expanded Chicago laboratory, will devote a major portion of his activity to metal surface preparations for war industries. Long served with the Aluminum Co. of America before coming to Turco Products, Inc.

Emmette R. Holman continues as chief chemist at the Los Angeles main laboratory of the company.

Plating industry friends of *Stanley Rynkofs*, shop superintendent of the *Liberty Plating Co.*, Los Angeles, staged a surprise house warming party for Stanley and his wife Mary at their new home, 2824 Rimpau Blvd., Los Angeles, on Sunday, July 18. The young couple was presented with an electric clock with Westminster chimes.

Attending were *Ernest Lamoreaux, Mr. and Mrs. Clarence Thornton*, the *Don Bedwells, Emmette Holmans, John Merigolds, Ernest Francis', Earl Coffins, Carroll McLarens, Ray Vasquez'* and *Marcus Rynkofs*, the latter the parents of Stanley and grandparents of that up-and-coming metal finisher-to-be, Mark Rynkofs II, aged 2½.

C. F. Braun & Co., 1000 S. Fremont Ave., Alhambra, Calif., has an expansion program underway, involving an expenditure of $51,500 for new buildings, including a research laboratory, X-Ray laboratory, employees' facility building and a drafting room.

Maritime Brass & Bronze Works, 1040 Lomita Blvd., San Pedro, Calif., is constructing a thousand dollar addition to its plant and installing new sanitary facilities in the existing structure at a cost of $1800.

Al Ginsberg, purchasing agent and traffic manager for *L. H. Butcher Co.*, Los Angeles, since 1929, has resigned to practice law in Los Angeles. He was formerly with the American Potash & Chemical Co. at Trona, Calif.

J. H. Andes has been appointed night superintendent of *Poulsen & Nardon, Inc.*, 2665 Leonis Blvd., Los Angeles.

Western Electro-Chemical Co., 2348 East 8th St., Los Angeles, has announced that plans are in preparation for the erection of a $6000 administration building in east Los Angeles, which will be constructed in connection with a plant to be converted for the firm by the Defense Plant Corp. at a total cost of $300,000.

Declaring that charges brought against *Berg Metals Corp.* of Los Angeles by the O.P.A. were not willful violations but omissions arising out of the confusion of instituting new methods of keeping records, Federal Judge *Ben Harrison* of Los Angeles on August 6 severely scored the O.P.A. for bringing the case to trial.

The case involved a demand by the O.P.A. to enjoin the firm from further violation of O.P.A. orders. In taking the case under advisement, the judge announced that the scope of any injunction issued against the company will be limited to violations *proved* in the testimony and findings.

Berg Metals Corp. was charged by the O.P.A. with failure to keep proper records of business transactions as required by O.P.A. regulations.

"There is no question of some omissions in the records of a large industry," Judge Harrison said. "There may be some errors in this case, but I think those are not the kind of errors the O.P.A. is looking for. This court is of the opinion that Congress did not realize what it was doing when it passed the amendments to the O.P.A. act. If they are going to crucify a firm for failure to dot an 'i' or cross a 't' in a case like this, I am helpless. It is a concrete example of a terrific abuse of the power of Congress, never intended to apply to regulatory bodies. . . . I am convinced that this is the worst miscarriage of a legitimate Washington order that I have ever seen in court."

The Berg Metals Corp. has a counter suit on file charging the O.P.A. with threatening to destroy its business and good will, claiming it has complied with all the O.P.A. re-

quirements, involving 96,000 individual documents for its 1942 business.

Aerojet Engineering Corp., 285 W. Colorado St., Pasadena, Calif., is converting a building at 15 North Vernon Ave., Pasadena, into an engineering and laboratory building at a cost of $18,000.

National Chloride Co. has been incorporated at San Bernardino, Calif., with capital stock of $50,000. Directors are *W. B. Pearson* of San Bernardino, *J. H. Jones* of Colton, and *W. C. Helm* of Twenty-Nine Palms, Calif.

James D. Williams, M. S. Schley and *Clarence A. Barker* of Los Angeles have received articles of incorporation for *Beaver Base Metals, Inc.*, capital stock $25,000, with headquarters in the Richfield Bldg., Los Angeles.

Dr. Sidney W. Benson, who has earned fellowships to Harvard and Columbia and has done research for General Electric Co. and City College of New York, has been added to the chemistry faculty of the University of Southern California, Los Angeles.

The demand for workers in specialized fields has grown so acute in Southern California that the University of California War Training Program has inaugurated two new courses in tool engineering at Los Angeles. The courses are designed to help meet the demand for men by aircraft plants.

Acquisition by his company of a controlling interest in the *Phonette Co. of America*, manufacturer of radio components, was announced early in August by *Randolph C. Walker*, president of *Aircraft Accessories Corp.*, 166 West Olive Ave., Burbank, Calif. The Phonette Co. will be operated as a subsidiary of the electronics division of Aircraft Accessories Corp., which is a large producer of transmitters and other radio equipment for aviation and other uses. The electronics division operates plants in Kansas City, Kan., and Slater, Mo.

Associations and Societies

American Electroplaters' Society

LOS ANGELES BRANCH

Los Angeles Branch, A.E.S., held its annual picnic in City Park, Montebello, Calif., on Sunday, July 25, with approximately 65 members, their families and friends attending. Picnic chairman *Stanley Rynkofs*, ably assisted by *Ed Wells*, *Jim ApRoberts* and *John Merigold*, handled the arrangements. It was an old-fashioned, bring-your-own-basket-lunch affair, with the branch supplying free soda pop and ice cream.

An alfresco lunch in the shade of a Bougainvillea arbor at noon was followed by an afternoon of games and races. The wilier members, like *Frank Schulo*, *Ernest Lamoreaux*, *Alex Regmunt*, *Bruno Schindle* and *Marcus Rynkofs*, found comfortable seats in the shade of the eucalypti trees, and it was obvious by the expression on their faces that they were content to let *Emmette Holman*, *Jim ApRoberts*, *Stanley Rynkofs*, *Walter Morgan*, *Ed Wells*, etc., win the defense stamps by galloping about the park in sack races and 100-yard dashes.

Ernest Lamoreaux, donor of the Lamoreaux Award for the best paper read before Los Angeles Branch during the 1943-44 fiscal year, has named *Marcus Rynkofs*, *Don Bedwell*, *Clarence Thornton* and *Earl Coffin* to serve as the judges who will determine the prize-winning paper. In case of a tie vote, Mr. Lamoreaux will cast the deciding ballot. The competition began with the September 6 meeting and will end with the June, 1944 session. All papers read before the branch during that period will be eligible for consideration by the award committee. Los Angeles members have presented some exceptionally fine papers in recent years, including one which won a $50 prize at the 1942 national convention of the Supreme Society.

Mr. Lamoreaux has chosen a well-balanced committee of judges capable of adequate judgment of the papers. Included on the committee are two independent plating shop

operators, a shop foreman and the branch manager of one of the country's largest plating equipment manufacturers. Mr. Lamoreaux himself contributes 25 years experience in practical plating shop activity and 25 years as sales representative for Hanson-Van Winkle-Munning and its predecessors. It would be difficult to choose five men better qualified for the task assigned them.

NEWARK BRANCH

On October 23rd, Newark Branch of the A. E. S. will hold an educational session at 3:30 in the afternoon followed by a testimonial dinner at seven o'clock in honor of *Horace Smith* and *George Wagner*.

The meeting, which will be held at the Robert Treat Hotel in Newark, will feature talks by *Albert MacLeod* of *Dow Chemical Co.* whose subject is to be "Finishing of Magnesium"; *Frank Mesle* of *Oneida, Ltd.*, who will give a paper on "A Study of the Adherence and Corrosion Resistance of Silver Plate on Steel", and *Myron B. Diggin* of *Hanson-Van Winkle-Munning Co.*, who will talk on "Lead Plating".

The Electrochemical Society

The Annual Fall Meeting of The Electrochemical Society is scheduled to take place in the Hotel Commodore, New York, October 13-16.

Among the papers accepted for presentation are the following:

"Electrolytic Reduction of Trinitro Aromatic Compounds to Triamines by Use of a Carrier Catalyst", by *Lewis and Brown*, Indiana University, Bloomington, Ind.

"Electrolytic Reduction of p-Nitrobenzoic Acid to p-Aminobenzoic Acid" by *Brown, Lewis and Ravenscroft*, Indiana University, Bloomington, Ind.

"Corrosion Resistance of Silver Plated Steel: Phosphating the Steel Before Plating", by *P. J. Lo Presti*, Rochester, N. Y.

"Electrolytic Reduction of Cinnamic Acid. A New Preparative Method for B-Diphenyladipic Acid" by *Wilson and Wilson*, London.

"Iron Plating" by *W. B. Stoddard*, Champion Paper and Fibre Co., Hamilton, O.

"Study of the Deposition Potentials and Micro-Structures of Electrodeposited Nickel-Zinc Alloys" by *Benjamin Lustman*, International Minerals and Chemical Corp., Austin, Texas.

"Corrosion of Lead-Indium Diffusion Alloys" by *Freund, Linford and Schutz*, Columbia University, N. Y.

"The Electrolytic Reduction of Amides I., N. N-Dimethylvaleramide and Acetanilide" by *Sherlock Swann*, University of Illinois, Urbana, Ill.

"Novelties in Electroplating" by *O. P. Watts*, University of Wisconsin, Madison, Wis.

"The Electrogalvanizing of Strip Steel" by *E. H. Lyons*, Meaker Co., Chicago, Ill.

Electroplating Courses

The Institute of Electrochemistry and Metallurgy, 59-61 East Fourth Street, New York, N. Y., will offer specialized courses in electroplating and metallurgy during 1943-1944. Registration for the Fall term will be held September 20-24 and the first class will be held on September 28th.

(Concluded from page 552)

Considerable laboratory work has also been done on the development of procedures for the production of colored films—reds, yellows, greens, blues—and excellent results have been obtained which will be reported at some future date.

Literature Cited

(1) Aluminum Company of America, "Alcoa Aluminum and Its Alloys" (1942).

(2) Bengough, G. D., and Stuart, J. M., British Patent 223,994 (Nov. 3, 1924); U. S. Patent 1,771,910 (July 29, 1930).

(3) Flick, F. B., U. S. Patent 1,526,127 (Feb. 10, 1925).

(4) Hill, H. N., and Mason, R. B., "Metals and Alloys" *15*, 972-5 (June 1942).

(5) Holman, E. R., "Metal Finishing" *39*, 132-136 (Mar. 1941).

(6) Mutual Chemical Company of America, "Anodizing Aluminum by the Chromic Acid Process" (Nov. 1942).

(7) Tarr, O. F., Darrin, Marc, and Tubbs, L. G., "Ind. Eng. Chem." *33*, 1575-80 (Dec. 1941); "Metal Finishing" *40*, 106-111 (Feb. 1942).

(8) Tubbs, L. G., Proc. 30th Ann. Conv. Am. Electroplaters' Soc.; 121-134 (June 1942).

(9) U. S. Army-Navy Specification AN-QQ-S-91 (Dec. 12, 1938).

(10) U. S. Army-Navy Specification AN-QQ-A-696a (Apr. 11, 1941).

(11) U. S. Patents on sulfuric acid processes: 1,526,127; 1,869,058; 1,900,422; 1,946,147; 1,946,152. Related U. S. Patents: 1,771,910; 1,891,703; 1,946,151; 1,965,682; 1,965,684.

Business Items

The Sturgis Products Co., of Sturgis, Mich., manufacturers of "Roto-Finish" and other mechanical finishing supplies and equipment, has announced the appointment of the following companies as distributors:

Wagner Bros., 1249 Holden Ave., Detroit.

Frederic B. Stevens, Inc., 510 Third St., Detroit.

Crown Rheostat & Supply Co., 1910 Maypole Ave., Chicago.

Geo. A. Stutz Mfg. Co., 1641 Carroll Ave., Chicago.

Lasalco, Inc., 2820 La Salle Ave., St. Louis.

Sommers Bros., 3439 N. Broadway, St. Louis.

Munning & Munning, 202 Emmett St., Newark.

MacDermid, Inc., Waterbury, Conn.

W. D. Forbes Co., 303 Washington Ave. N., Minneapolis.

The Reynolds-Robson Supply Co., 4623 Paul St., Frankford, Philadelphia.

W. M. Fotheringham, 977 Niagara St., Buffalo.

Green Electric Sales Corp., 130 Cedar St., New York 6, N. Y., has adopted the trade-mark shown at the left. The company has also shortened its identification from "Builders of Selectro-Platers and All Types of Rectifier Equipment" to "Rectifier Engineers".

The Pennsylvania Salt Manufacturing Co., Philadelphia, Pa., has announced that its board of directors has elected *Charles G. Berwind* as a director of the company to fill the vacancy caused by the death of *William M. Potts*. Mr. Berwind is vice president and director of the Berwind-White Coal Mining Company and is also a director of The Pennsylvania Co. for Insurances on Lives and Granting Annuities and of the Philadelphia Orchestra Association.

Green Electric Sales Corp. has announced that its Selectro-Platers and Multi-Platers are now being distributed on the Pacific coast by *The Hill Electric Co.*, 2600 South San Pedro St., Los Angeles, Cal. This arrangement is the result of the recent trip made by *E. I. Huppert, Jr.* of the Green organization. Mr. Huppert spent some time with the Hill Company familiarizing them with the finer details of Green selenium rectifiers.

Clarence C. Helmle

Dr. Walter R. Meyer, technical director of *The Enthone Co.,* New Haven, Conn., has announced that on August 16th *Clarence C. Helmle* joined the technical staff of the company. Mr. Helmle is a chemical engineer, a graduate of Rensselaer Polytechnic Institute, class of 1932. After graduating, he went with the *General Electric Company's Bridgeport Works,* where he was successively plating analyst, chemist and finally head of the Inorganic Laboratory in charge of electroplating, metallurgy and general chemistry.

Mr. Helmle has been very active in electroplating. He is Supreme Second Vice-President of the American Electroplaters' Society and past officer of the Bridgeport Branch of the Society. He is a member of the Electrochemical Society and was an instructor for several years in chemistry, electrochemistry and metallurgy at the Bridgeport Engineering Institute. He has contributed various articles to electroplating literature.

Mr. Helmle will be engaged in plating equipment design, process development and technical service.

The partnership known as the *J. J. Siefen Co.,* polishing and finishing supplies, was dissolved as of June 30th, 1943, and the firm incorporated in the state of Michigan with a capital of $100,000. The officers of the new company are: *J. J. Siefen,* president; *John F. Siefen,* vice-president; *D. A. Gaines,* secretary, *and I. E. Siefen,* treasurer. The factory is being enlarged to triple its former size at the same location—5657 Lauderdale, Detroit, Mich.

C. M. Bradford of the *Mitchell-Bradford Chemical Co.,* 2446 Main St., Bridgeport, Conn., manufacturer of a black oxide process for the treatment of steel, has announced the appointment of *William H. Price, Jr.,* as director of sales. Mr. Price formerly was divisional manager in charge of a large portion of the eastern seaboard territory for the company.

Personals

Edward Magnuson, president of *Magnuson Products Corp.*, 50 Court St., Brooklyn, N. Y., manufacturer of cleaning compounds, has been elected president of the Swedish Hospital, Bedford Ave. and Dean St., Brooklyn. In recognition of his charitable endeavors, he was decorated with the Order of Vasa, first class, by King Gustav of Sweden in the fall of 1941.

Arthur J. Mintie

Arthur J. Mintie is now connected with the *Independent Nail & Packing Co.*, Bridgewater, Mass.

Mr. Mintie started plating under his father, James H. Mintie, who at that time was with the Waterbury Buckle Co., Waterbury, Conn.

After a few years, he returned to school attending Northeastern University from which he was graduated with honors. He then started work with the *Tubular Rivet & Stud Co.* where he remained for 32 years.

In 1941 at the A. E. S. Convention in Boston, Mr. Mintie received an award for his plating exhibit.

He is expert in barrel plating and finishing, particularly in barrel chromium plating and hot-dip finishing.

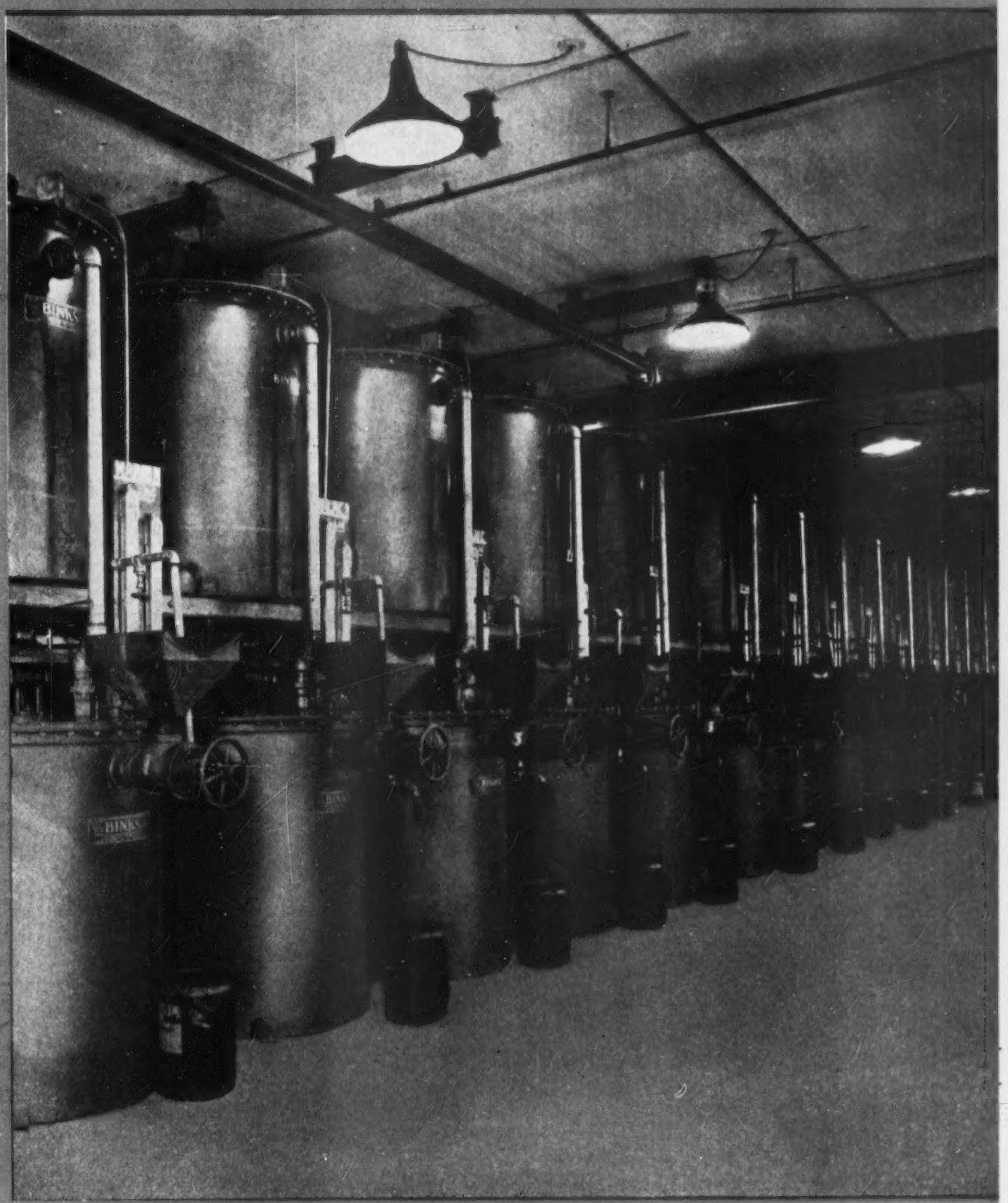
H. Harold Bulkowski, chemical engineer, has been appointed to the research staff of *Battelle Memorial Institute*, Columbus, O., where he will be engaged in electrochemical research.

Mr. Bulkowski was graduated from the Carnegie Institute of Technology in December, 1942. Prior to going to Battelle, he was associated with the *Shell Development Co.*, Wilmington, Calif.

SEPTEMBER, 1943

ORGANIC FINISHING

SECTION OF METAL FINISHING



LACQUERING • ENAMELING • JAPANNING • PAINTING

New Zapon Wrinkle S-637 for War Work

Synergism helps overcome lack of china wood oil!

Zapon's new wrinkle finish, made without use of critical china wood oil, is now available and should continue available for all essential needs of war production. Numbered S-637 in the Zapon series, it has many applications on today's important products.

This new wrinkle by Zapon has all the advantages of previous Zapon wrinkle finishes. It is highly resistant to water, grease and other agents; it is tough and long wearing, permits fine or coarse wrinkles, and provides uniform wrinkle formation.

Once more minds clicked synergistically to help create this new product. Chemist sat down with chemist to determine how a sound wrinkle finish could be secured without scarce china wood oil. Formulas were compared, tested, improved, and today Zapon S-637 is on the production firing line, bringing the many advantages of wrinkle finish to a wide variety of armament parts.

WHAT IS SYNERGISM?
In Synergism, forces—minds—work together to produce results greater than both working separately might achieve, making 2 + 2 = 5.

Licensed by New Wrinkle, Inc.

ZAPON
REG. U. S. PAT. OFF.

ZAPON DIVISION · ATLAS POWDER COMPANY

Eastern Sales: Stamford, Conn. *Western Sales:* North Chicago, Ill.

INDUSTRIAL FINISHES

Section of
METAL FINISHING
Founded January, 1908 as Metal Industry
Publication Office
11 West 42nd St., New York, 18, N. Y.

ORGANIC FINISHING

SECTION OF METAL FINISHING
SEPTEMBER, 1943

CONTENTS

Cover Photograph

Battery of mixing tanks. — *Courtesy of Binks Mfg. Co., Chicago.*

Baking Organic Finishes

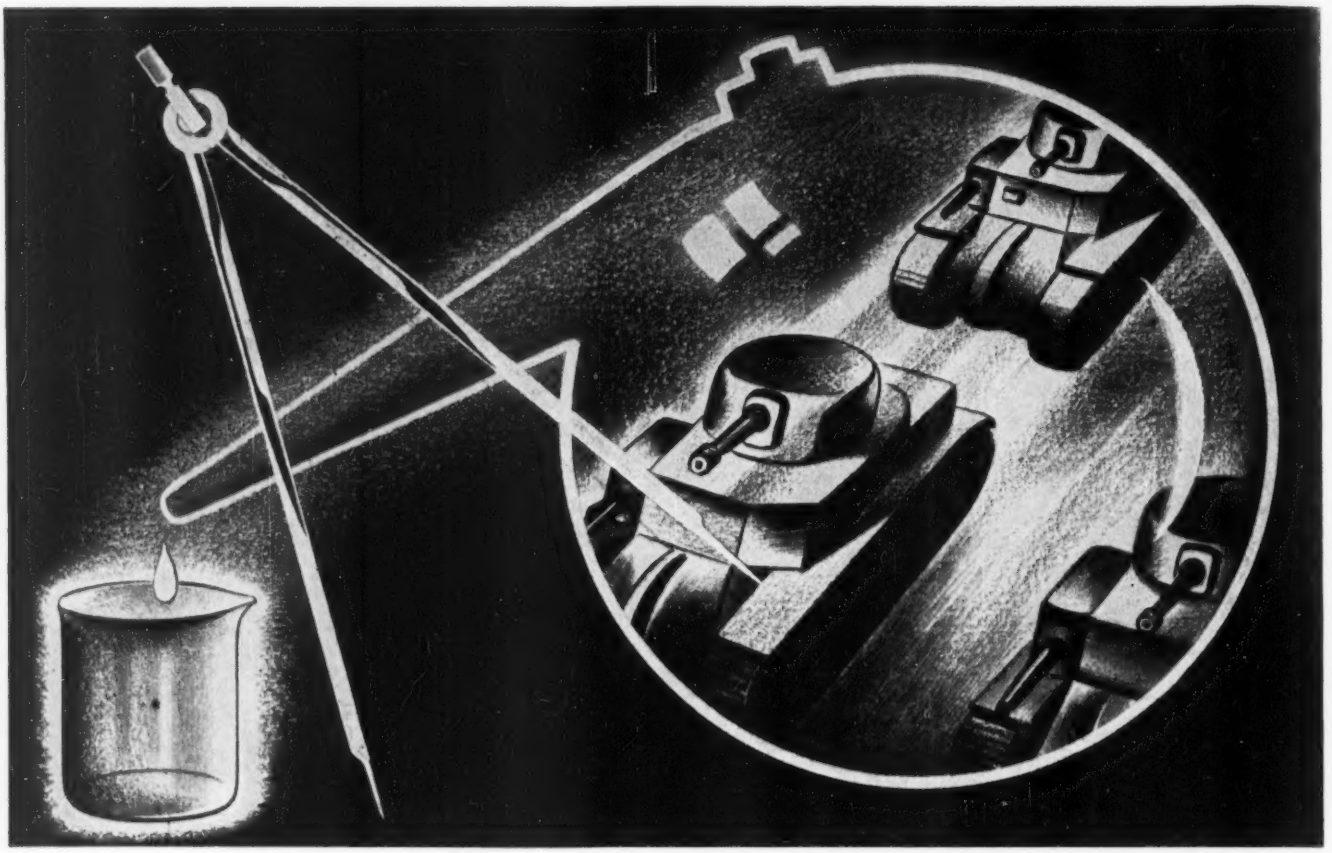
It is sometimes not thoroughly appreciated that the baking of organic finishing materials is a chemical process and that, like all processes involving chemical reactions, consistently good results are obtained only if conditions are closely maintained within carefully chosen limits. Baking materials cure by means of oxidation, polymerization, etc., and it is not enough that a finish be baked only to produce a film which is neither soft and tacky nor brittle and discolored. For any finishing material baked in a particular oven, there is a set of conditions of time and temperature which will give the best film characteristics.

It is possible, of course, to obtain satisfactory results with some types of finishing materials using a variety of time-temperature combinations. However, there are many other materials—particularly those based on modern heat converting resins—which are quite critical and must be baked correctly; otherwise a film which may appear satisfactory but will fail in service will result.

Improper baking may be due to the choice of incorrect baking cycles. On the other hand, poor baking is often the result of poor oven maintenance. Flues may become clogged. Circulating fans may become inefficient. Dampers may change position. Burners may become clogged or heating elements burned out. Simply because outside thermometers indicate the correct temperature and a stop watch check shows the proper conveyor speed, there is no assurance that the actual bake is the same as it was when the baking cycle was first tested and used.

Oven manufacturers urge that baking ovens be given careful and regular maintenance and that periodic checks be made of the actual temperatures in all parts of the baking zone. This is good advice at any time. It is especially important that it be heeded now when many ovens are being operated almost continuously and at near limit speeds.

L. H. LANGDON, *Publisher* • WILLOUGHBY G. SHEANE, *Associate Editor* • T. A. TRUMBOUR, *Business Manager*



INDUSTRY KEEPS PACE WITH A NATIONS NEEDS . . .

Industry marches on . . . the greatest concentration of productive energy on a single goal in the history of civilization.

Keeping pace with the needs of rapidly moving war industry is the chemistry of technological finishes . . . producing coatings which will protect against the salt of the oceans . . . withstand corrosion of fumes and chemicals . . . impart valuable electrical or physical properties . . . stand up under abrasion, vibration or violent impact . . . bear the intense cold of Alaska or dry heat of Sahara or sultry dampness of New Guinea swamps . . . answer untold and often secret requirements of war plants and laboratories.

You can improve your product by improving its finish. For war-time needs now . . . or peace-time requirements when the war is won . . . our experience can help you. Your inquiry incurs no obligation.

Address The Stanley Chemical Company . . . manufacturers of Stanley Lacquers, Enamels, Synthetics and Japans . . . East Berlin, Connecticut.

Stanley Chemical

THIS IS WASHINGTON—

By George W. Grupp

METAL FINISHING's Washington Correspondent

Aliphatic Alcohols Under Allocation The higher aliphatic alcohols were placed under allocation control by Allocation Order M-344 on August 14, 1943 because the demands for these chemicals are exceeding the present available supplies. Under this order 2-ethyl hexanol, normal octanol, normal decanol, and lauryl alcohol were placed under control. In revoking Order M-167 on the same day, capryl alcohol which came under it was placed under Order 344.

Allyl Alcohol and Allyl Chloride Allocated Allyl alcohol and allyl chloride were placed under allocation control by the issuance of Allocation Order M-342 on August 15, 1943. Deliveries of less than 50 pounds of either chemical to one manufacturer from all suppliers during a calendar month is permissible without specific WPB authorization.

Benzene Restricted Further Benzene was restricted further by Allocation Order M-137, as amended July 23, 1943, because of the increased demand and because some buyers have evaded the original restrictions by buying small amounts from a number of different suppliers. Henceforth, manufacturers using less than 50 gallons of benzene a month are required to certify to the suppliers and to the WPB that they are not using more than that amount.

Butyl Alcohol Prices Amendment No. 7 to Maximum Price Regulation No. 37, issued on July 29, 1943, provides for a sliding scale of maximum prices of butyl alcohol, based on each producer's average monthly costs. The amendment establishes a base maximum price of 19½ cents a pound, f. o. b. works, for sales in tank cars by integrated producers when the producer's butyl alcohol cost is computed at 15 cents per pound. It also fixed a base of 20½ cents a pound for drum carloads, and 21 cents a pound for less than carload lots in drums.

Cadmium Uses Restricted The WPB amended Conservation Order M-65-a on July 27, 1943 for the purpose of prohibiting the use of cadmium in many types of automotive equipment, building supplies and hardware, house furnishings and equipment and miscellaneous items. It also banned cadmium from use in *pigments*, except in *luminescent paints for military uses*, luminescent printing inks for military uses, luminescent paper for military uses, luminescent plastics for military uses, artists' colors, signal and illuminating glassware for safety, religious and industrial uses only, thermometer tubing, thermosetting plastic buttons for military uses, dental rubber and rubber sea buoys.

Carbon Black Order Eased General Preference Order M-244, which was amended on July 20, 1943, and is now known as Allocation Order M-244, provides that it is no longer necessary for manufacturers requiring furnace type of carbon black in quantities between 100 and 5,000 pounds in any month to obtain direct or specific allocation from the War Production Board. They now merely have to place orders for such quantities with their suppliers. The suppliers, on the twentieth of each month, must furnish the Chemicals Division of the WPB with a complete list of the orders received.

Allocation of Lacquers In the future the Chemicals Division of the WPB will require more information from both consumers and producers on the uses of methyl isobutyl ketone to aid it in a better allocation of lacquers and thinners, according to General Preference Order M-322, as amended August 10, 1943.

Munsell Color Book Specifications Discussed In the August 1943 edition of the *Journal of Research* of the National Bureau of Standards, Kenneth L. Kelly, Kasson S. Gibson, and Dorothy Nickerson discuss in detail the master standards of the Inter-Society Color Council—National Bureau of Standards (ISCC-NBS) system of color names based on the color standards in the Munsell Book of Color.

High Flash Naphtha Control High flash naphtha was placed under control by Aromatic Petroleum Solvents Allocation Order M-150, as amended July 28, 1943, at the request of distributors and producers because of the increased demand for this product. The amended order increased the exemption from specific authorization of the acceptance of delivery from 60 to 550 gallons of all aromatic petroleum solvents, except high flash naphtha, per calendar month. Aromatic petroleum solvents covered by this order, other than benzol and toluol, containing over 30 per cent of aromatic hydrocarbons are determined by methods described in "Proximate Analysis of Hydrocarbon Thinners," Circular No. 568 of the National Paint, Varnish and Lacquer Association.

Paint, Varnish, Lacquer and Filler Sales The total sales of paint, varnish, lacquer and fillers in the United States by 680 manufacturers amounted to $273,193,897 during the first six months of 1941 as compared with $284,006,756 in the same period in 1942 and with $280,472,015 during the same period in 1943. The total sales in 1941 amounted to $555,398,819 as compared with $529,745,027 in 1942.

Protective Coating Order Amended Because of the unsatisfactory working of Conservation Order M-332, it was amended on July 27, 1943. The amended order, which covers oils for protective coatings, now provides that it is necessary for the oil or non-volatile content to be at least 65 per cent of the product. The amendment also releases wholesalers' stocks on hand before July 1, 1943. In addition to that it unfreezes crushers' stocks on consignment with wholesalers made before July 1, 1943.

Natural Resins Order Amended Conservation Order M-56 which restricted the use of dammars, copals and other natural resins, but which did not cover shellac or pine resin, was revoked on July 28, 1943 to encourage the importation of Belgium Congo copal.

Rosin & Turpentine Production in India Production figures of India for the first quarter of 1943 reveal that during that period, 1,315 long tons of rosin and 319 long tons of turpentine were produced.

Non-Mercury Ship Bottom Paint A Japanese broadcast has revealed that a new formula, without mercury, for ship bottom paint, has been developed in Japan. Cuprous oxide and mercuric oxide are normally used in the making of ship bottom paint.

Steel Drum Uses Restricted Used steel drums which are suitable for packing either edible products or naval stores products may not be used for any other purposes according to Amendment No. 1 to Limitation Order L-1971 issued on August 14, 1943. A definition of naval stores was given to mean "those materials which are directly derived from the oleo-resinous secretions of various species of coniferous trees; the term includes resins and liquid terpenes, both crude and refined, special materials derived from these, and such related products as tall oil and pine tars."

Oils for Finishing Materials

By STANLEY T. DINGMAN

Linden, N. J.

This is another in the series of discussions on the raw materials used in the manufacture of organic finishing materials. Some of the more important drying and semi-drying oils are described, drying and driers are discussed, and interesting general information is given. —Ed.

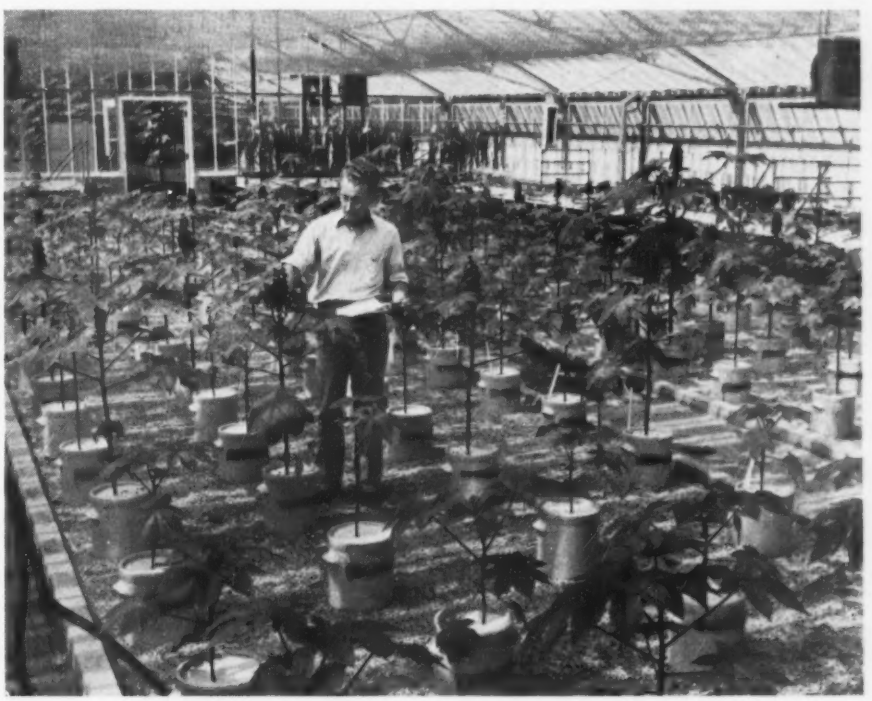
IT has been said that a protective coating based on oil is no better than the oil from which it is made. This is true, of course, but it is no longer possible to judge a coating merely by knowing the kind of oil used. It is necessary also to take into consideration the treatment given to the oil, the type of pigment incorporated in the vehicle, the surface on which it is to be used, and the type of service to which it is to be subjected. Oils from the same source may even vary in quality and performance so it is impossible to formulate a satisfactory coating merely by specifying an arbitrary amount of a given kind of oil to be mixed with other ingredients. Today, protective coatings are formulated on a scientific knowledge of the characteristics of each batch of oil used.

During war times, when large quantities of oils are required for other uses, the problem of securing sufficient stocks of satisfactory paint and varnish oil is intensified. In the United States the problem has become especially acute because of our long dependence upon foreign sources. A list of the very names of oils used in paints and varnishes conjures up visions of distant jungles, forests, and plains. Babassu, chufa, mocooya, palmiche, perilla, oiticica, soya, tung, and uoucuoy—strange plants and trees growing in the tropical belt, from China and India, through Africa to South and Central America—all have made some contribution to the science of protecting and beautifying all types of surfaces. From these sources drying oils have found their way into millions of gallons of paints, varnishes and lacquers, and other types of organic finishing materials produced in the United States each year. Today, a global war has shut off the normal sources of many drying oils and brought an increased interest in the study of domestic paint and varnish oils.

Drying Oils

To be of value in the manufacture of finishing materials, the chief property which any oil must have is an ability to combine with oxygen from the air and form a tough, impermeable and elastic film. Generally speaking, only vegetable oils have this ability, and while not all vegetable oils are drying oils, no known mineral or animal oils, with the exception of some marine animal oils, show this characteristic. Seals and whales, and fish (including sardine, pilchard, tuna, and menhaden) furnish oils of value to the paint and varnish industry.

Drying oils are variously classed as drying or semi-drying, depending upon the extent to which they combine with oxygen. The relative hardness of the film produced by this action is also considered in the classification of the oil. Experience has indicated that the iodine number of an oil is a good index of its ability to unite with oxygen and by determining the iodine number of an oil it is possible to judge quickly its value as a drying oil. Drying oils have iodine numbers rang-



To aid in commercial plantings of castor bean plants in the United States, the U. S. Department of Agriculture studies the cultural needs of these plants. Dr. Neil W. Stuart, plant physiologist, records the growth of plants that have received plant nutrients in varying combinations. These plants are growing in sand cultures in a greenhouse at the U. S. Horticultural Station, Beltsville, Md.

(Illustrations courtesy U. S. Department of Agriculture. Photographs by Smith, Teuton and Killian.)

Tung fruit nuts and cross section of fruit.

ing from 160 to 200, while the semi-drying oils have iodine numbers from 130 to 160. Linseed oil, one of the best known and most widely used oils, has an iodine number of 186 and is thus well within the range set for drying oils.

In some instances, however, the drying characteristics of an oil can be changed chemically to produce desired qualities. Some oils with low iodine numbers can be economically converted into drying oils. Castor oil, for instance, has an iodine number of 84.5. It would, then, be classified below the semi-drying oils and considered a non-drying oil. By a relatively simple chemical reaction, the hydroxy group and one hydrogen atom are removed, converting it to an oil somewhat similar to tung oil which has an iodine number of 157.

Domestic Oils

Why is it that this country, which undoubtedly far surpasses any other country in the manufacture and use of coating materials, is so dependent on foreign raw materials? It is because this country is naturally deficient in plants which produce oils with the properties required for making satisfactory coatings. Even those plants which can be grown here, such as flax, do not contain as large quantities of oil as similar species grown elsewhere. Plants such as the poppy, the seeds of which yield an oil of excellent quality, are subject to so many legal restrictions that their cultivation and use is impractical. This is also true of hemp. The legal restrictions are due to the fact that the poppy yields opium and from hemp comes marijuana, another powerful and vicious drug.

Even linseed oil, perhaps the most important and best known of all drying oils, has become more scarce as merchant shipping has geared itself to the demands of war. Although flax, from which linseed oil is obtained, can be and is grown in this country, less than one-quarter of the amount of seed required is produced here. In 1936, for example, about 900 million pounds of flaxseed were imported from Argentina, in contrast with the somewhat more than 250 million pounds produced in the United States. One possible reason for this difference in flaxseed production is that emphasis in this country may have been placed on the culture of flax for the fiber from which linen yarn is spun. It is true that all flax plants produce both seeds and fiber. However, those producing the most seeds do not give the best fiber and, conversely, those producing the best fiber have the lowest seed and oil yield. Because of the growing necessity of finding domestic sources of supply, it is likely that the trend here will be toward developing flaxseed production. Linseed press cake, the solid matter left after the oil has been extracted, is, incidentally, an excellent livestock feed and in these days of animal feedstuff shortages, additional quantities of linseed press cake would be well received.

What is true of linseed oil is also true of practically every oil of importance to the paint, varnish, and lacquer industry.

Some oil producing plants can be raised in the United States and neighboring countries but climatic and soil conditions and economic factors have in the past made this impractical. Consequently, foreign sources were depended upon to supply the needed oils. Today, efforts are being made to reestablish and increase the plantings and yields of those plants which can be raised here.

Experimental plantings of chia, perilla, safflower, and other oil bearing plants have been begun in this country. How successful such plantings will be remains to be seen. However, with the current scarcity of agricultural labor and the higher wages paid to such labor in this country, it is not likely that the domestic supply will meet the current demands for oils. Successful plantings of soya beans and tung nut trees have been established here. Cultivation of the latter is confined to the area near the Gulf of Mexico but with careful selection and breeding there seems to be no reason why this industry cannot be built up to a significant degree. Soya beans are already well established but recent regulations regarding the pressing and processing of the beans undoubtedly hinder, at least for the moment, full development of this source of paint and varnish oils.

Linseed Oil

While it is possible to use some oils direct from the seeds or nuts from which they are extracted, experience has shown that certain treatments improve the quality of the oil. Much of the linseed oil used by the paint and varnish industry is commonly known as raw linseed oil. Actually, the oil may have been subjected to one of several different treatments to remove the foots. Generally, the oil is aged for considerable periods of time to

permit the colloidal material, or foots, to settle out. If this material is not removed, it forms a large gelatinous mass, known as the break, when the oil is heated in the varnish kettle.

Among the refined and semi-refined linseed oils are the following:

Aged linseed oil.—An amber colored oil from which the break has been removed by long heating at low temperatures. This is a rapid bodying oil.

Boiled linseed oil.—Actually, this is not a boiled oil. The oil is merely heated to the temperature necessary for satisfactorily incorporating the driers. Adding the driers in this manner usually produces a dark oil and now a paler boiled oil is made by adding liquid driers direct to raw oil.

Alkali refined linseed oil.—A practically neutral oil used for making pale varnishes and enamels. It is made by adding alkali to neutralize the free fatty acids of the oil. This reaction forms a soap which is immediately dissolved by the addition of boiling water. The soap and water settle out, bringing down the break with them. After all the water has been removed, the oil is bleached with Fuller's earth and the wax is then taken out by a freezing process.

These types do not represent all of the types of linseed oil used in paint and varnish manufacture. Some 20 to 25 different refined oils, each with individual properties that fit it for specific applications, are available. Raw linseed oil has a slightly pleasant odor and taste and a golden color. Upon exposure to air in thin layers, this oil takes up increasing quantities of oxygen and the molecules tend to polymerize and set to a solid gel. When subjected to temperatures of 200 to 300°C., linseed oil tends to thicken in the same manner as when raw oil is exposed to air. In this process, known as heat bodying, however, the polymerization or gelation appears to take place before the oxidation rather than after it.

Tung Oil

Chinawood, or tung, oil is another of the better known drying oils. Tung oil bodies faster and dries faster than linseed oil. Also, it has better gloss retention and durability and is much more waterproof. A disadvantage of tung oil is that it frosts and wrinkles on drying unless processed. This processing is quite difficult. When heat bodied, tung oil undergoes two contradictory reactions. At temperatures of 282 to 288°C. the oil polymerizes rapidly and if not retarded with some other material will solidify quickly. If heated to 307°C. or higher, however, tung oil undergoes a reaction that actually decreases the danger of gelation and from the oil so treated an oil that will body like linseed can be prepared.

Three-roller laboratory paint mill grinds paints in soybean oil.

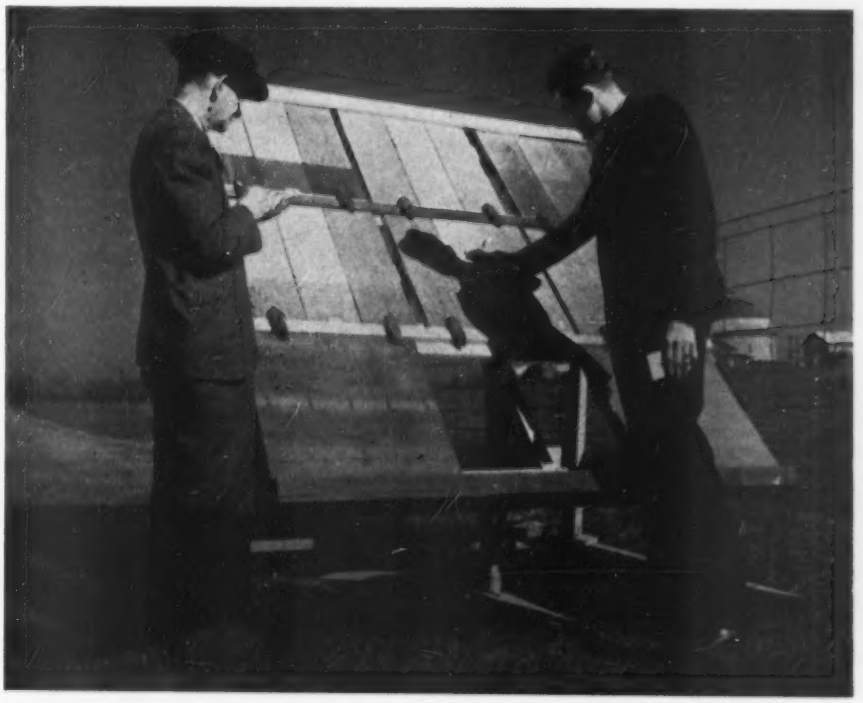
Converting an oil that has very definite advantages of its own into an oil that behaves like linseed oil is, however, not a well advised procedure. Therefore, efforts have been made to incorporate the best qualities of tung oil with those of linseed oil. Oils produced by blending polymerized tung oil and specially processed linseed oil make an excellent vehicle for house paints. They have the high waterproofing and durability characteristics of bodied tung oil combined with the advantages inherent in linseed oil. Satisfactory long oil enamels can be produced with tung oils. Such oils do not react with the pigments and their gloss retention is good. After-yellowing is no greater than that of other long oil enamels and the resistance to oil and alkali is better.

Soybean Oil

Soybean oil normally has an iodine number of about 132 which would classify it at the bottom of the semi-drying oil range. However, this oil has several properties that make it especially useful in the preparation of protective coatings. By removing an anti-oxidant material normally present in the oil, soybean oil can be converted into a suitable oil for use with linseed, tung, perilla, oiticica, or dehydrated castor oil.

Perilla Oil

Perilla, a golden yellow oil having an iodine number ranging between 185 and 205, can be refined in much the same manner as linseed oil. As indi-



Inspecting test panels of soybean varnish on 45° exposure rack.

cated by its higher iodine number, perilla oil dries faster than linseed oil. In its raw state it has a tendency to crawl but this can be corrected by heat bodying. Inasmuch as perilla oil has been produced largely in Japan and the Far East, the supplies now available are greatly restricted.

Oiticica Oil

An oil that has been receiving increasing attention is oiticica oil, obtained from a nut native to Brazil. In many of its properties this oil can be classified between linseed and tung oil. It dries faster and heat bodies faster than linseed oil but is less rapid in both these actions than tung oil. Oiticica oil also has better waterproofing qualities than linseed oil but is less efficient in this respect than chinawood oil.

Fish Oils

Fish oils, because they can be derived from so many varieties of marine animals, may show wide divergence in composition. Generally, however, they have an iodine number ranging from 190 to 200 when properly treated. Improved methods of handling the fish prior to pressing out the oils keep putrefaction to a minimum and eliminate most of the impurities. Films and coatings made from fish oils, however, may have a decided odor, although research work to overcome this fault is being continued. To purify the fish oil by the removal of the unsaturated fatty acids, the oil is subjected to refrigeration. By this process, often called winterizing, suitable drying oils which remain clear at low temperatures are obtained. Heat bodied and alkali refined fish oils are being used rather extensively today.

Drying Agents

When spread in thin layers and exposed to air, the oils commonly used in the manufacture of paints and varnishes will dry to a tough, elastic film. This natural drying, however, usually requires such a long time that even heat bodied oils, which are those in which the setting has been partially accomplished by heating, will not dry fast enough to meet most application requirements. Linseed oil, for instance, may require from five to six days to dry in air to a hard film but when the proper driers are added, this time may be cut to as little as eight hours. Consequently, agents which speed up this drying action are usually added to the oils.

Naturally, since oils differ in their chemical and physical properties, no single material can be used as a universal drier. Each type of oil requires a different catalytic agent to speed its drying time.

For a long time compounds of cobalt, manganese, and lead have been found to be effective in speeding up the drying time of oils. These materials are still widely used but since the beginning of the century a new method of using the metals has become important since it allows use in liquid form. Compounds of the metals are precipitated and then dissolved or dispersed in a volatile solvent or in a small quantity of oil. Only small percentages of these materials need be added to provide an acceptable drying time. In raw linseed oil, for example, 0.2 per cent of lead drier and 0.02 per cent of manganese drier, or 0.025 per cent of cobalt drier, will give an eight hour dry.

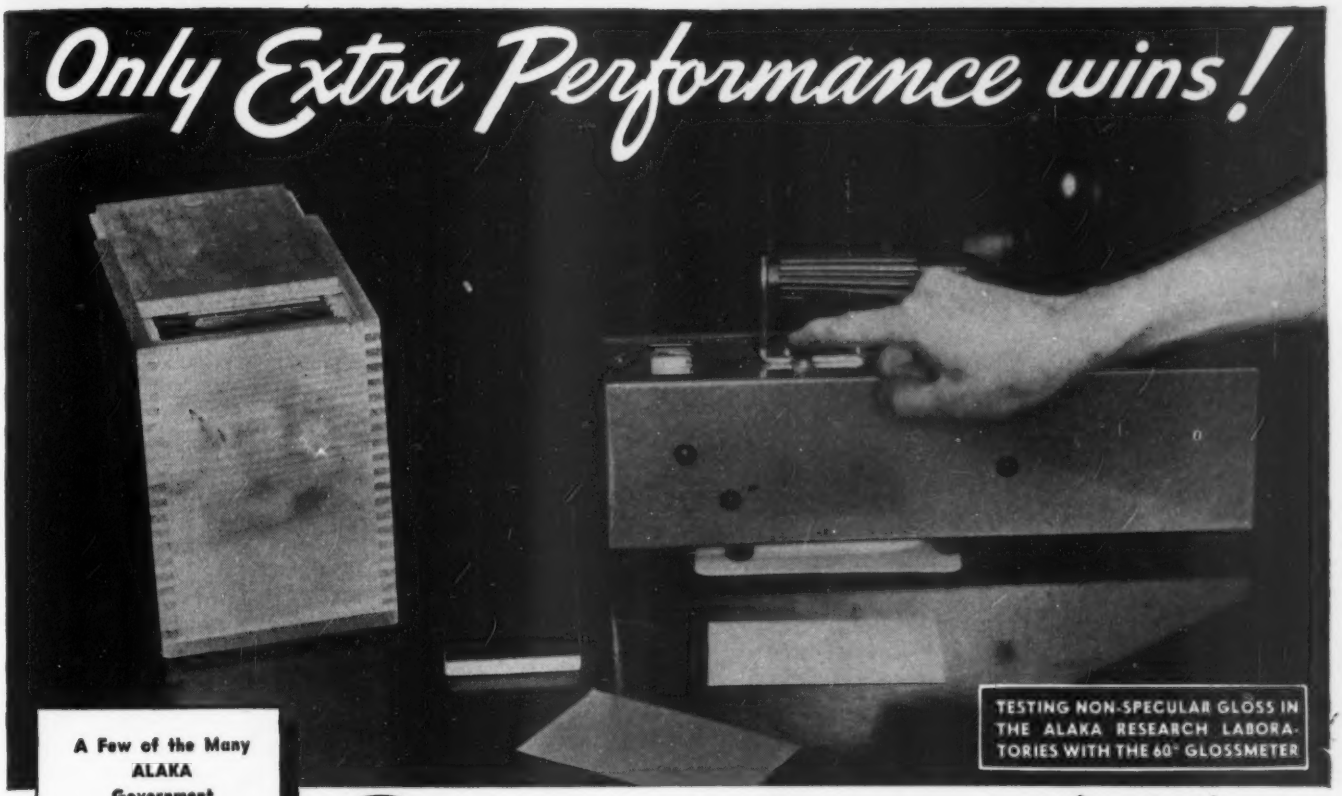
Lead, which is the least strong of the driers, is considered to be a "through" drier, that is, it tends to speed the drying throughout the film. Cobalt, the fastest, and manganese, the next fastest, are "surface" driers.

(*Concluded on p.* 613)

TABLE I — Characteristics of Oils

Oil	*Country of Origin*	*Iodine Number*	*Saponification Number*	*Specific Gravity*
Almond	Mediterranean	95	191	0.1985
Apricot	Asia	102	196	0.9195
Babassu	Brazil	15.6	256	0.8680
Camellia	Japan	.....	.....	.....
Castor Beans	East Indies	84.5	185	0.9640
Chufa Nuts	Africa-Brazil	76.5	191.5	0.9120
Cocoa Beans	Central America	36.5	193.5	0.9630
Coconut	Tropics	8.7	253	0.9115
Corn Germ	United States	119	190	0.9235
Cottonseed	Asia-Africa-U. S.	109	194	0.9235
Hemp Seed	Asia	148	192.5	0.9268
Kapok	East & West Indies	92	192	0.9199
Linseed	Asia	186	193	0.9330
Oiticica Nuts	Brazil	179.5	188.6	0.9694
Osage Orange	United States	101	196	0.9290
Palm Kernel	Africa	13	246	0.9520
Palmiche Nuts	Cuba	.....	.....	.....
Peanuts	Africa	91	193	0.9190
Phulwara Butter	India	42	191	0.8590
Poppy Seed	Asia Minor	138	195	0.9255
Pumpkin Seed	Orient	126	188	0.9237
Rape Seed	Orient	98	175	0.9150
Rubber Seed	Brazil	132	195	0.9270
Safflower	Egypt	139	189	0.9266
Sesame	India	105	191	0.9234
Soy Bean	China-Japan-U. S.	132	193	0.9256
Sunflower	South & Central Am.	127	194	0.9249
Tung Nut	China-Japan	157	193	0.9396
Channel Catfish		123	192	0.9230
Fur Seal		132	182	0.9250
Menhaden		158	187	0.9320
Salmon		159	183	0.9270
Sardine		135	177	0.9190
Pilchard		191	192	0.9310
Shark		133	158	0.9100
Shark Liver		136	62	0.9220
Skate Liver		152	180	0.9320
Tuna Fish		184	190	0.9330
Whale		148	.....	0.9240

Only Extra Performance wins!



TESTING NON-SPECULAR GLOSS IN THE ALAKA RESEARCH LABORATORIES WITH THE 60° GLOSSMETER

A Few of the Many ALAKA Government Specification Finishes with Non-Specular Gloss as a Major Consideration

•

U. S. ARMY AIR CORPS
14105-B
Lacquer
Cellulose Nitrate
Camouflage

•

U. S. ARMY AIR CORPS
14106-A
Dope
Pigmented Nitrate
Camouflage

•

U. S. NAVY AERONAUTICAL
M-485 c
Lacquer
Non-Specular

•

U. S. NAVY AERONAUTICAL
M-498
Dope
Cellulose Nitrate
Pigmented, Non-Specular

Does your lacquer hold
ITS SPECIFIED NON-SPECULAR GLOSS?

The Army and Navy are making our enemies know that our planes "are there"... without being seen. Visibility, in terms of gloss or reflection is vitally important.

In their specifications for aircraft finishes, they definitely indicate the permissible degree of gloss, with a small measure of tolerance.

They require that the finish on a plane in Sicily, Italy, New Guinea, the Aleutians or over the Ruhr, has the same degree of non-specular gloss, as it had when it was made, tested and approved. They expect, require and in fact, demand, that the finish holds its specified non-specular gloss regardless of the time which elapses between manufacture and actual service.

ALAKA HOLDS ITS NON-SPECULAR GLOSS. Here's the Proof:

Aircraft Lacquers
SPECIFICATION LIMITS....0.1 to 0.3 per mil

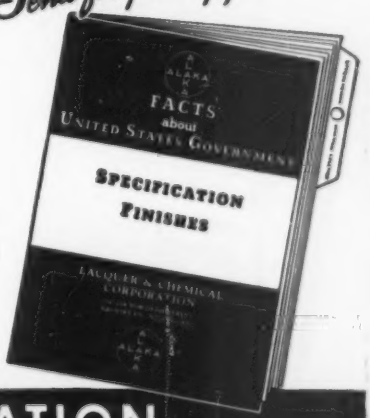
ALAKA Lacquers
When Manufactured.....0.1 per mil
After 3 months.....0.1 per mil
After 6 months.....0.1 per mil

ALAKA — *Extra Performance*

This Extra Performance can help you. May we show you how?

- **New, Complete**
- **up to the minute**
- **Catalogue of**
- **U. S. Government**
- **Specification Finishes**

Send for your copy



LACQUER & CHEMICAL CORPORATION
214-222 FORTIETH STREET · BROOKLYN 32, N. Y.

A SPRAYING QUESTIONNAIRE

Conclusion

(The first installment of this questionnaire appeared in the August issue of "Organic Finishing.")

Question. What are gravity feed buckets?

Answer. Gravity buckets (Figure 24) are material containers placed or hoisted to some height above the gun to obtain fluid pressure by means of gravity. They are somewhat inconvenient to use and give limited pressures which vary depending on the height above the gun. They are not widely used.

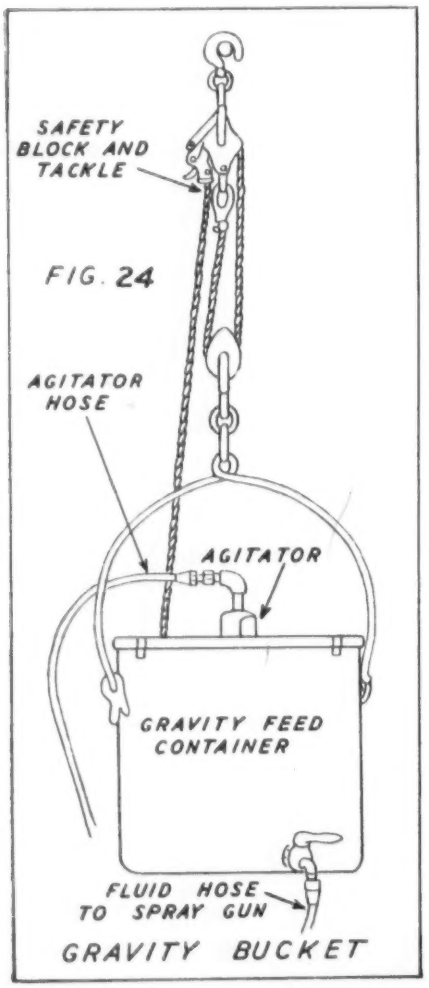


FIG. 24

FIG. 25

Question. How should finishing material be prepared for spraying?

Answer. Stir material thoroughly before adding reducer. Use kind and amount of thinner recommended by material manufacturer. Add thinner slowly to material and stir thoroughly. If material contains lumps or skins, strain through a wire screen or cheesecloth. (Figure 25.)

Question. How should a spray gun be held?

Answer. A spray gun should be held perpendicularly to the surface at all times at a distance of 6 to 10 inches. (Figure 26). A simple and convenient method of determining the proper distance is shown in Figure 27.

Question. What is the procedure for touch-up?

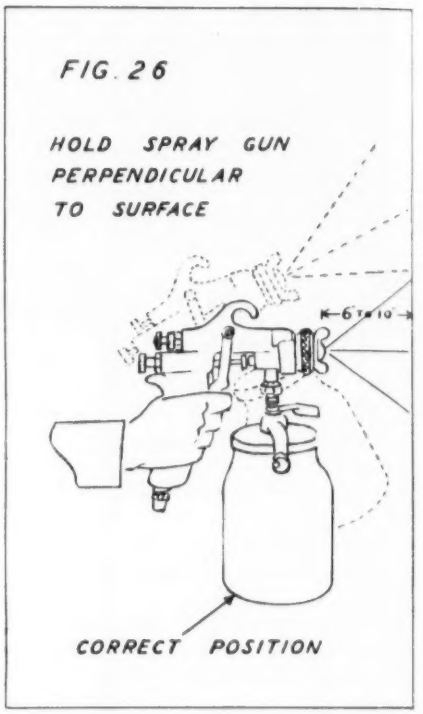


FIG. 26

Answer. Sand area to be repaired, feathering edges carefully. Spray sanded area carefully keeping overspray to a minimum. Apply a mist coat of thinner to smooth out rough spots of finishing material.

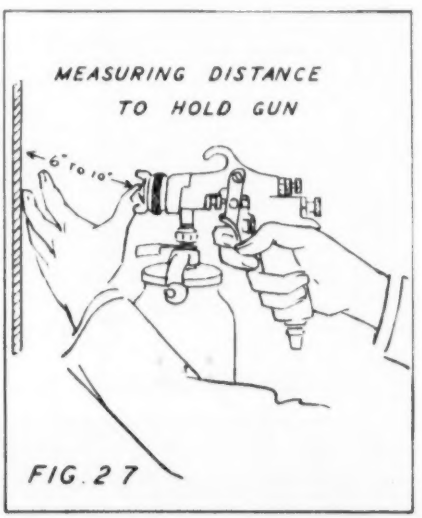
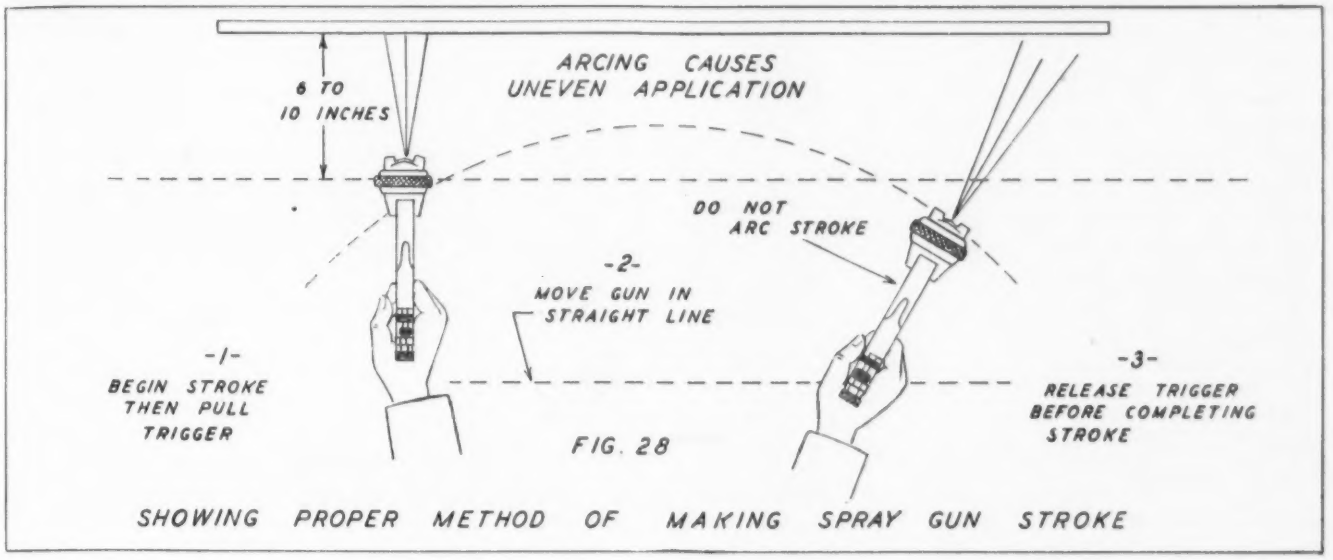
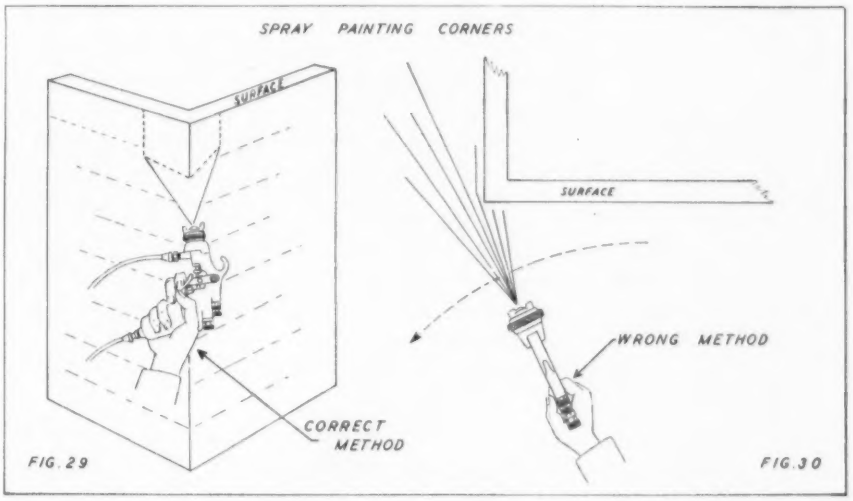


FIG. 27





Question. How is the proper stroke made?

Answer. The stroke is made with a free arm motion, keeping the gun parallel to the surface at all points of the stroke. (Figure 28.) The ends of the strokes are feathered out by triggering the gun, that is, by beginning the stroke before pulling the trigger and by releasing the trigger before the end of the stroke. Arcing the gun results in uneven application and excessive overspray at the end of the stroke.

Question. How are corners sprayed?

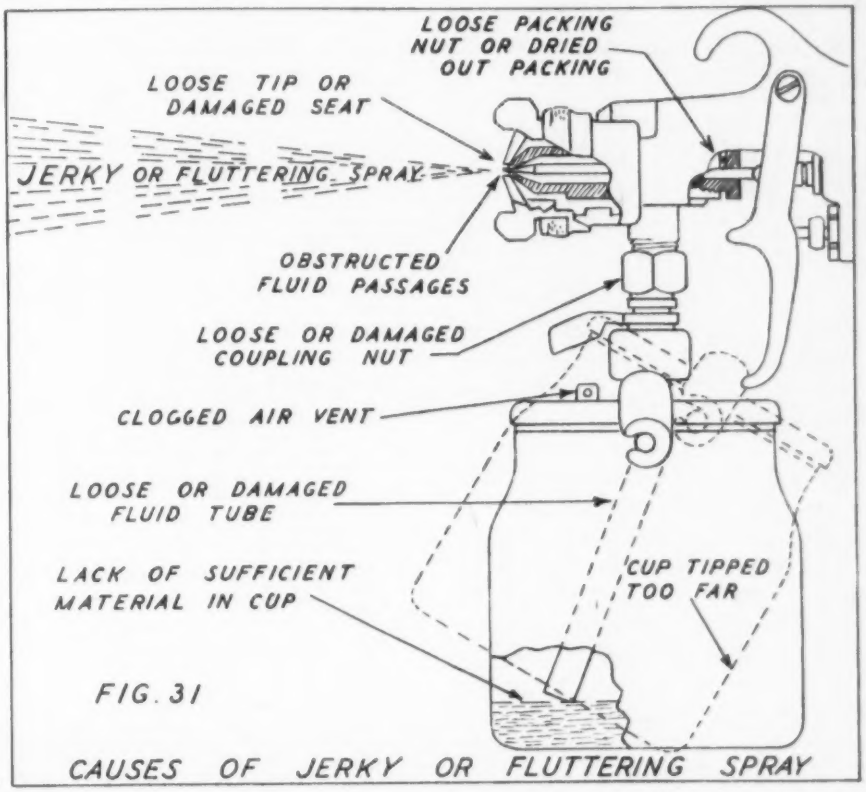
Answer. Spray within 1 or 2 inches of corner. (Figure 29.) Then, holding gun sidewise, spray both sides of the corner at once. To spray corners otherwise (Figure 30) wastes material and may give excessive overspray.

Question. How fast should the gun be moved?

Answer. The speed with which a gun should be moved depends on the material being sprayed, the rate of material flow, the character of the surface being sprayed, etc. Adjustments should be made for maximum speed consistent with the ability of the sprayer and the finish desired.

Question. What causes a jerky or fluttering spray?

Answer. This condition is the result of air leakage into the fluid line. (Figure 31.) Air leakage in both



pressure and suction feed systems may be due to lack of sufficient material in the container, tipping the container to an acute angle, obstructed fluid passageway, loose or cracked fluid tube in the container, loose nozzle or damaged tip seat. In suction feed systems only the air leakage may be due to too heavy material, loose or damaged coupling nut on cup lid, clogged air vent in cup lid, loose packing nut or dried out packing, or fluid tube resting on bottom of cup.

Question. What causes mist or fog from spray guns?

Answer. Mist or fog may be due to too high atomizing pressure, too low fluid pressure (pressure feed), incorrect nozzle or fluid tip for material being sprayed, incorrect stroking, gun held too far from surface. (Figure 32.)

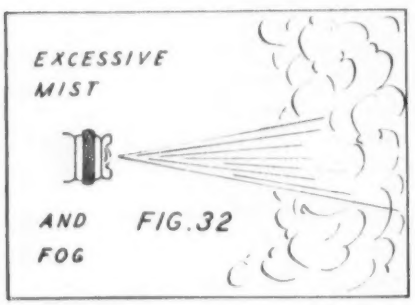
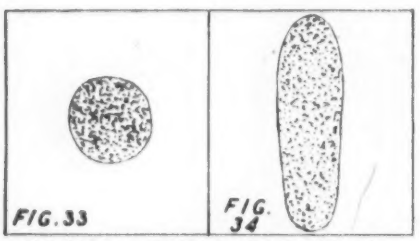


FIG. 32

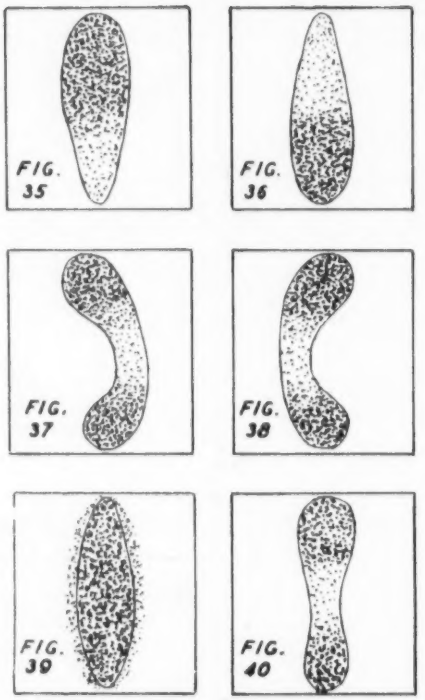
Question. What causes defective spray patterns?

Answer. Normal spray patterns are illustrated in Figures 33 and 34.



NORMAL SPRAY PATTERNS

Heavy top pattern (Figure 35) or bottom pattern (Figure 36) may be caused by dirt on nozzle seat or fluid tip seat, by partially clogged air holes in nozzle, or by obstruction on top side or bottom side of fluid tip. Heavy right side pattern (Figure 37) or left side pattern (Figure 38) may be caused by dirt on right side or left side of fluid tip or by right side or left side of air holes in nozzle being partially clogged. Heavy center pattern (Figure 39) may be due to too large nozzle for material being sprayed, too high fluid pressure, too low atomizing pressure, too viscous material, or too low setting of spreader adjustment: Split spray pattern (Figure 40) is due to improper balance between air and fluid.



DEFECTIVE PATTERNS

To remedy heavy top, bottom, or side pattern, determine if obstruction is on nozzle or fluid tip. Rotate nozzle a half turn and spray another pattern. If defect in pattern is inverted (Figure 41), obstruction is on nozzle. If defect is not inverted, obstruction is on fluid tip.

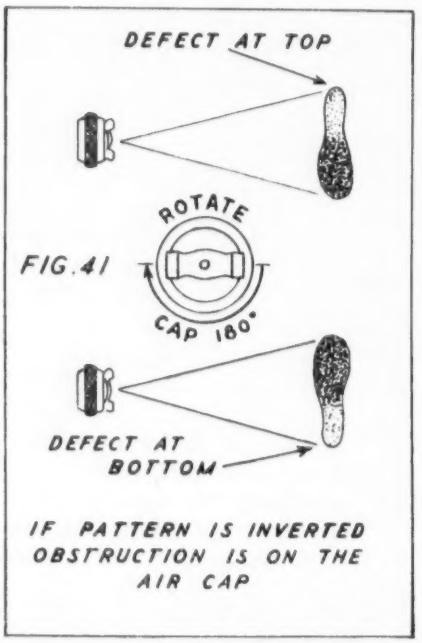


FIG. 41

To remedy heavy center pattern or split spray pattern, readjust atomizing pressure, fluid pressure, and spray width adjustment until desired spray is obtained. Split spray pattern is eliminated by reducing width of pattern or by increasing fluid pressure.

Question. What causes "orange peel"?

Answer. A common cause of orange peel is the use of improper thinner. Other causes are: insufficient atomization, gun held too far from surface, material not thoroughly mixed, gun held too close to surface thus causing rippling. Orange peel is illustrated in Figure 42.

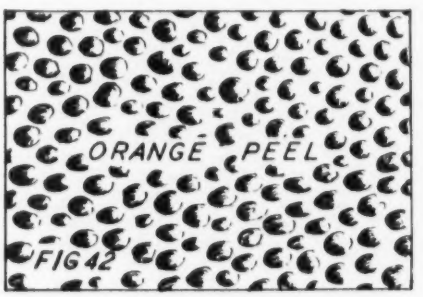


FIG 42

Question. What causes streaks in finish?

Answer. Streaks are caused by tipping the gun (Figure 43) or by defective spray patterns.

Question. What causes runs and sags?

Answer. Runs and sags are caused by applying too much material. Reducing fluid pressure and increasing operating speed will eliminate runs and sags.

(Illustrations and material for this article courtesy The De Vilbiss Co., Toledo, O.)

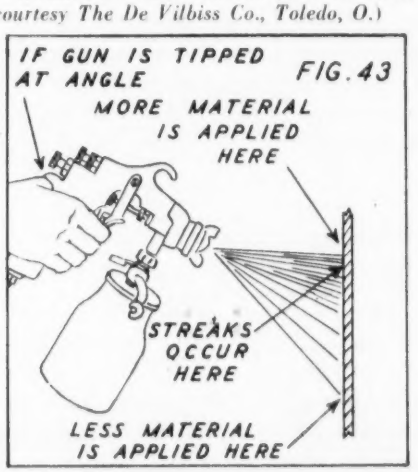


FIG. 43

ARMOR-VIT ... now on army field ranges

ORIGINALLY, Army field ranges were made of stainless steel. Due to the need for conversion to less critical materials, this specification was changed to galvanized sides and back, porcelain enameled interior, zinc plated castings, and all other parts finished in oil or wax.

But Army field ranges have to "take it" whether in the Aleutians or the Solomons. The transportation hazards and abuse to which they are subjected are almost unbelievable. 800° F. in the interior, with salt air or salt-water on the exterior. ...Well, the ordinary finishes just wouldn't stand up—and the army said "No" to any bright metals in the field.

The problem was to get a finish that had both endurance and low reflectance. The answer was: **ARMOR-VIT.** Here was a finish, available in olive-drab, gray or black, which was highly resistant to corrosion, rust, impact, scratching, abrasion, heat, thermal shock, alkalis, or acids. Its lusterless, matte finish provided the necessary camouflage.

Being a priority-free finish, **ARMOR-VIT** is making it possible for some manufacturers to substitute iron or steel for the more critical metals, such as chromium, zinc, nickel, cadmium, bronze, brass, tin, etc. Investigate **ARMOR-VIT** today. It has remarkable properties.

Although ceramic in nature, there is no comparison between **ARMOR-VIT** *and porcelain enamel, paint, lacquer or synthetic finishes. It is non-volatile, non-explosive. It withstands heat of over 1000° F., and is unaffected by the standard 200-hour salt spray tests, or weatherometer tests equal to 5 years normal weather.*

ARMOR-VIT DIVISION

CHICAGO VITREOUS ENAMEL PRODUCT CO.

Cicero, Illinois

Patents

Paint Inspection

U. S. Pat. 2,320,842. C. F. Arnold & L. L. Kortkamp, assignors to General Motors Corp., June 1, 1943. The method of painting or lacquering and determining the presence or lack of thin spots therein which includes applying an undercoat containing a fluorescent material, applying one or more layers of paint or lacquer to the undercoat, subjecting the paint or lacquer coating to conventional sanding or smoothing operations, and inspecting the coating under ultra-violet light whereby any thin spots in the paint or lacquer are readily visible due to the excitation of the fluorescent material in the undercoating.

Coating Composition

U. S. Pat. 2,321,127. A. T. Camp, assignor to Hercules Powder Co., June 8, 1943. The process for preparing a soft oil-limed rosin varnish having an oil length within the range from about 5 to about 100 gallons of oil per 100 pounds of rosin and a combined calcium content within the range from about 1 to about 5% by weight of the total rosin in the varnish which comprises heating from about 25 to about 80% of the total soft oil contained in the finished varnish composition in contact with up to about 25% of the rosin contained in the finished varnish composition at a temperature within the range from about 565 to about 620° F. until the mixture starts to gel, adding sufficient material selected from the group consisting of rosins and limed rosins to provide the remainder of the rosin contained in the finished varnish composition, adding the remainder of the soft oil, heating the mixture at a temperature within the range from about 500 to about 620° F. until the mixture has attained the desired viscosity, and thinning with a solvent.

Coating Iron and Steel

U. S. Pat. 2,321,889. G. C. Bailey & O. Johnson, assignors to E. I. duPont de Nemours & Co., June 15, 1943. The method of coating a ferrous metal surface with rubber comprising applying directly to said surface a red lead metal primer composition, drying the resulting primer coating, and depositing a rubber coating on said primer coating from a rubber latex, said primer composition being devoid of rubber and rubber derivatives.

Paint Spray Machine

U. S. Pat. 2,321,982. T. F. Brackett, assignor to General Motors Corp., June 15, 1943. A spray machine including an upstanding gun guide track, a base on which the bottom of the track is mounted, a sub-base slidably supporting the base for lateral travel, and means pivotally mounting said sub-base on a vertical axis.

Varnish Base Manufacture

U. S. Pat. 2,322,106. L. Auer, assignor to Ridbo Laboratories, Inc., June 15, 1943. In the preparation of varnish bases, a multistep process comprising first heating a batch of an organic isocolloid varnish base material selected from the class consisting of fatty oils and resins to a temperature above 100° C., but not above 350° C. or the boiling or decomposition point, with from 2% to 30% of a polar compound, to modify the properties of said batch of varnish base material extensively, including raising the solidification point and viscosity thereof, and thereafter blending said extensively modified varnish base material with a second batch comprising an additional constituent of the varnish base being prepared which additional constituent is selected from the class consisting of fatty oils and resins, and heating the blend to a temperature above 100° C., but not above 350° C. or the boiling or decomposition point thereof; the modification in the material of said first batch being of greater extent than could be effected therein by the same treatment applied to the total varnish base being prepared; whereby a modified varnish base is secured having improved characteristics, such as color and drying properties, as compared with a similar modified varnish base secured by conjoint treatment of the several constituents thereof.

Coating Composition

U. S. Pat. 2,322,242. F. W. Lanigan & J. G. Mark, assignors to Dewey and Almy Chemical Co., June 22, 1943. The process of producing a coating composition including the steps of subjecting rubber to a depolymerizing treatment and then colloidally dispersing the depolymerized rubber in a wax in such proportions and under such conditions that the resulting compound possesses in its molten state an immaterially increased viscosity over that possessed by the base wax at the same temperature.

Insulating Enamel

U. S. Pat. 2,323,333. H. J. Kauth, assignor to General Cable Corp., July 6, 1943. A baked coating on wires comprising the combination of a drying-oil modified alkyd resin, with a resin produced by the partial condensation of furfuryl alcohol.

Enamel Composition

U. S. Pat. 2,323,334. H. J. Kauth, assignor to General Cable Corp., July 6, 1943. The method of compounding an enamel having a furan resin base and containing a flexibilizing agent to improve its qualities for use as a wire coating, which method comprises condensing furfuryl alcohol to a density not substantially less than 14.8° nor substantially greater than 17.4° Baumé at 70°C., stopping the further condensation thereof, and adding thereto a synthetic linear polyamide which is a reaction product of a linear polyamide-forming composition comprising a member of the class consisting of polymerizable monoaminomonocarboxylic acids and a mixture of a diamine and a dibasic carboxylic acid.

Gelling Prevention

U. S. Pat. 2,323,338. A. D. Macdonald, assignor to B. B. Chemical Co., July 6, 1943. The method of inhibiting thickening and gelling of a liquid dispersion of malodorant-free plastic polymerized chloroprene in an organic solvent, which comprises incorporating in said dispersion a salt of the group consisting of sodium monobasic phosphate (NaH_2PO_4) and sodium phosphite (Na_2HPO_3).

Organic Coating

U. S. Pat. 2,323,357. I. Rosenblum, July 6, 1943. The method of producing solutions of ureaformaldehyde condensate which form stable mixtures with oil acid-modified alkyd resins, which comprises reacting a urea and aqueous formaldehyde in the presence of an alcoholic solvent under pressure sufficient to enable a reaction temperature of at least about 110°C. to be obtained, continuing the heating under pressure until an advanced stage of condensation is reached and a hydrophobe condensate is obtained, cooling the reaction mixture, whereupon two liquid layers are formed, and separating the upper, resin-containing layer from the lower, aqueous layer.

Paint Mixing Machine

U. S. Pat. 2,323,403. A. P. Jorgenson, assignor to Landon P. Smith, Inc., July 6, 1943. In a paint-mixing machine, agitating means comprising a drive shaft having an eccentric crank portion whose axis is disposed at an acute angle to the axis of said shaft, a driven shaft, universal means connecting said driven shaft to said eccentric crank portion, a swivel bearing supporting the other end of said driven shaft, said driven shaft being slideable and rotatable in said bearing.

Spray Nozzle

U. S. Pat. 2,323,464. D. P. Glessner, assignor to Akron Brass Mfg. Co., Inc., July 6, 1943. A spray nozzle comprising a tubular body, a baffle head therein, the end portion thereof being disposed in spaced relation with the end of said body to define a circular port for the delivery of a conical stream, said baffle having a central port therein and a plurality of convergent openings, said openings being inclined towards each other in pairs and towards the central port so that the jets discharged therethrough impinge each other and the resultant spray partially impinges the jet from the central port and partially impinges the divergent conical stream.

Dispersion of Pigments

U. S. Pat. 2,323,877. F. L. Turbett, assignor to The Eagle-Picher Lead Co., July 7, 1943. The method of manufacturing a paint product in which the pigment is in a very finely divided state in a liquid paint vehicle, which comprises mixing pigment with the vehicle forming a rough or partially wetted suspension of the pigment in the vehicle,

then subjecting the rough or partially wetted suspension to an impacting force in the presence of a gaseous medium to form a gaseous suspension of finely sub-divided pigment particles in an envelope of vehicle, then finally breaking the latter suspension by removal of the gaseous medium whereby the pigment and vehicle coalesce.

Pouring Paint

U. S. Pat. 2,323,964. Z. B. Andrews, July 13, 1943. A pouring fitting for containers, said fitting comprising a hollow body adapted to be mounted on a container, said body having a valve seat of circular cross section and having a pouring opening leading outwardly to and terminating at said seat, the body having a recess leading inwardly from the seat closely adjacent the said pouring opening and separated circumferentially of the seat from said opening by a relatively narrow wall which terminates radially outwardly at said seat, and a valve closure member turnably mounted on the body and with an inner surface complementary to the seat, the closure member being open at one side so as to expose the opening, the radially outward surface of said narrow wall and fully to expose the recess in one turned position of the member.

Coating Composition

U. S. Pat. 2,324,078. D. M. Gray and F. M. deBeers, Jr., assignors to Stoner-Mudge, Inc., July 13, 1943. A thermally stable coating composition adapted to be spread upon metal and thereafter baked with consequent release of solvent and chemical inter-reaction between the resinous components, in which the resinous components comprise (1) 97 to 65 parts by weight of a co-polymer of a maleic derivative selected from the group consisting of maleic anhydride and maleic acid, and a vinyl derivative responding to the formula $CH_2=CHX$ in which X is selected from a group consisting of the halogens and the saturated aliphatic monocarboxylic acyloxyl radicals containing no more than 6 carbon atoms in the alkyl group attached to the esterifying carboxyl group, wherein the percentage by weight of maleic derivative lies between 1 and 5; and (2) 3 to 35 parts by weight of a ketone-soluble resinoid selected from the group consisting of the non-oil-modified, alkaline condensed, phenol-formaldehyde resinoids, alkyl-substituted phenol-formaldehyde resinoids in which the total number of carbon atoms in the alkyl groups attached to the parent phenol nucleus comprises no more than 6, and mono-aryl-substituted phenol-formaldehyde resinoids in which the total number of carbon atoms comprised within the substituting aryl group does not exceed 12 of which 6 are constituted within a benzene ring and the remainder are found in alkyl groups modifying that benzene ring; a baked-out film of which is capable of withstanding fabrication and sterilization processes without sacrificing coating integrity and adhesion, or manifesting deleterious process blush and loss of gloss.

Dipping Lacquer

U. S. Pat. 2,324,098. C. J. Malm and G. J. Clarke, assignors to Eastman Kodak Co., July 13, 1943. A dipping lacquer comprising one part by weight of a hydrolyzed cellulose organic acid ester selected from the group consisting of cellulose butyrates containing from 51-55% butyryl, cellulose formate butyrates, cellulose acetate butyrates, cellulose propionate butyrates, in which the butyryl content is greater than 30% and the total acyl content is greater than 51%, said esters being hydrolyzed to at least approximately one free hydroxyl group per 12 hydroxyls of the cellulose unit, dissolved in approximately 4 to approximately 6 parts by weight of toluene, said lacquer being capable of solidification by gelation while containing all or substantially all of the original solvent content when cooled to a temperature within the range of 10-50°C.

Coating Composition

U. S. Pat. 2,324,432. J. M. Schantz, assignor to Hercules Powder Co., July 13, 1943. A coating composition characterized by low color, by high color stability, and by high alkali resistance, comprising a heat-bodied mixture of a drying oil and a polyhydric alcohol ester of a crystallized rosin acid having a neutral body content below about two per cent by weight and an acid number above about 181, formed by heating said mixture at a temperature between about 500°F. and about 600°F.

Fire Defense In Finishing Rooms

By LEONARD F. MAAR

Safety Research Institute, Inc., New York, N. Y.

A FINISHING room fire is likely to travel so fast, fed on the flammable materials present, that unless it is put out almost as soon as it starts, it may cause considerable damage. Therefore, the essence of fire defense consists of a high degree of fire prevention and suitably located equipment for the automatic or manual extinguishment of incipient fires.

This is a good thing to remember during Fire Prevention Week which will be observed this year beginning October 3. And Fire Prevention Week is an appropriate time to check over the precautions taken in the finishing room to minimize fire losses.

A good beginning can be made by checking over the possible sources of ignition. Without a source of heat to start the process of combustion, there can be no fire. The following are possible sources of ignition:

1. Electric sparks caused by short circuits, broken light bulbs, defective fixtures that permit arcing, etc.
2. Metallic sparks caused by striking or dropping a ferrous tool or machine part against some object that will make a spark.
3. Friction caused by hot bearings, etc.
4. Static sparks resulting from static charges that may be accumulated in machinery or persons.
5. Spontaneous heating caused by the chemical reaction of drying oils under suitable conditions.

Means of controlling or eliminating these sources of heat, which might ignite the vapors of flammable liquids and solvents, are well known and rather obvious.

All electrical equipment should be installed according to the National Electrical Code. Lights should be fitted with vapor-proof globes. Motors should be located outside of the finishing room when possible or they should be of the vapor-proof type. Periodic inspection and cleaning of switch and fuse boxes, outlets and junction boxes, conductor insulation and motors should be a routine matter.

In finishing rooms where solvents of low flash point are used, spark-proof, non-ferrous tools should be used and workers should be required to wear shoes without nails to avoid striking sparks.

Careful maintenance of machinery and proper lubrication will eliminate the hazard of friction heat generated by hot bearings. Good housekeeping around machines will eliminate accumulations of oily dust or lint that might be ignited by friction.

The control of static electricity is a very special problem. The severity of the hazard will depend upon local conditions. However, it should be remembered that some workers generate and release more static than others. There have been instances where fires occurred repeatedly in connection with these workers until they were transferred to other departments where the hazard did not exist.

Spontaneous heating occurs mostly in wiping rags or waste that has become saturated with the vegetable drying oils. Here, again, good housekeeping is a cardinal rule. All such material should be disposed of without delay. Workers should be required to place such material in covered metal cans and the cans should be emptied and the contents burned at the end of each day.

Fire Protection

Concern about such matters in fire prevention is elementary, and after they have been regulated, attention should be given to fire protection. Probably nowhere else in industry is the need so imperative for equipment that will

The storage and use of solvents and other flammable liquids present a fire hazard that is of more than ordinary severity. First aid fire appliances should be kept within easy reach, as above, where a foam type extinguisher stands ready for instant use should a fire emergency occur.

function effectively the instant that fire starts as in the finishing room.

Fixed extinguishing systems, manual or automatic, of the carbon dioxide or foam types, should be installed at all dip tanks and spray booths and, of course, the construction of booths and tanks should conform to the regulations of the fire underwriters. Drying ovens need similar protection.

Since the class of fire that is most to be anticipated in finishing rooms involves flammable liquids, portable extinguishers capable of putting out such fires should be available in abundance. These include the vaporizing liquid, foam, loaded stream and carbon dioxide types.

All workers should be able to use this equipment. Periodic drills in which they are given opportunities for actually discharging the contents of extinguishers on practice fires constitute the most practical method for cultivating this ability.

Vigilance must be exercised to keep fire extinguishing equipment in good operating condition. Portable extinguishers should be inspected regularly and recharged according to the recommendations of the manufacturers. Heat actuated devices for operating automatic extinguishing systems should be inspected or tested and here, too, the recommendations of the manufacturers should be carefully followed.

In finishing rooms there should be frequent fire drills during which each worker is given a definite assignment so that when an emergency occurs he will know exactly what to do, thereby eliminating confusion and delay.

In many plants, such precautions have been routine matters but in the rush of work, there is the danger that they may degenerate to relative unimportance. That is when trouble can start. So, during Fire Prevention Week this year, make a careful check on the observance of measures of fire defense. It may disclose weaknesses that should be corrected in order to maintain the high standard of fire safety that finishing rooms require.

Paint Dictionary Supplementary Sheets

Stewart Research Laboratory, Dept. OF, 1340 New York Ave., N. W., Washington, D. C., make announcement that supplementary listings of terms to the National Paint Dictionary are now available. These listings, known as No. 1 of the Addenda, are contained on the fourteenth page of the National Paint Bulletin in five issues published since the last edition of the Dictionary came off the press. The listings may be clipped and inserted in the space provided at the end of the present volume, bringing it up to date as of July 1, 1943.

It is also announced that because of the war it will be several years before the next edition of the Dictionary will be printed and that after the present supply of supplementary addenda listings is exhausted, no reprints will be available.

Copies of the addenda listings are available to owners of copies of the Dictionary and may be obtained by writing to the Stewart Laboratory at the Washington address.

The Success of his Mission
REQUIRES DEPENDABLE AMMUNITION

For Greater Assurance
Steel Shell Cases and Ordnance Parts Should be Deoxidized with Deoxidine

The safe, effective, economical way to prepare steel shell cases, shells and other steel ordnance parts for the protective finish.

The substitution of steel shell cases for brass is one of the major accomplishments of American ingenuity in the present war. Details of drawing, annealing, finishing, etc., have been successfully worked out in plants and Government Arsenals where these problems were not entirely new.

The need for unusual protection of the finished shell case against rust in overseas shipment and use under severe climatic conditions, however, presents a new and serious problem to many manufacturers.

The best finishes available fail under severe exposure conditions if the surface on which they are applied is not clean chemically as well as mechanically, free from invisible rusters as well as visible rust. The DEOXIDINE process is admirably suited to the proper preparation of the metal to receive and hold a durable protective finish so necessary for "successful missions." The often overlooked, though important detail of proper rinsing in slightly acid solutions is accomplished with DEOXYLYTE as a part of the DEOXIDINE process.

The success of the steel shell case and all other ordnance parts in combat will depend upon close adherence to such seemingly unimportant details.

DEOXIDINE meets U. S. Ordnance Department requirements in removing rust and neutralizing rust producers before protective finishes are applied.

ACP will help in guiding you in the proper preparation of steel shell cases, shells and any other ordnance parts to receive the specification finish. Descriptive literature will be sent on request.

Manufacturers of Inhibitors & Metal Working Chemicals

AMERICAN CHEMICAL PAINT CO.
AMBLER ACP **PENNA.**

Note: West Coast Plants may address inquiries and orders for prompt delivery to, Leon Finch, Ltd., 728 East 59th St., Los Angeles, Calif.

American Chemical Paint Company, Ambler, Pa.

Please send me general Technical Service Data Sheets on

☐ Deoxidine ☐ Deoxylyte

*Name*_____ *Title*_____

*Company*_____

*Address*_____

C-9

CHEMICALS ACP PROCESSES

MR. TAYLOR: A good idea, Mr. Neilson —but I thought everyone was aware of the merits of PREP PRODUCTS.

MR. NEILSON: Well, I believe many paint superintendents do not understand that PREP PRODUCTS will clean the metal, remove rust and provide a better bond between the paint and metal surfaces.

MR. TAYLOR: Yes, while we know this, it is quite likely that these men do not, for instance, appreciate the value of PREPRITE, which provides a phosphate coating on ferrous metal surfaces.

MR. NEILSON: That's right, John—and I wonder how many men know of the value of GALVAPREP on all zinc-coated surfaces before painting.

MR. TAYLOR: Well, while we are about it, why not also tell them about PREP-WASH for use in tank systems—and PREP-PIKL for scale removal.

MR. NEILSON: And, about METALPREP—

MR. TAYLOR: Oh yes, we mustn't forget about the excellent job METALPREP is doing in eliminating very severe rust conditions in many war plants, and how we have been of assistance to the Quartermaster Corps, the Ordinance and other War Departments on rust problems.

MR. NEILSON: That's right, there's a lot to be said. Let's do a good job and take a full-page ad so we will have space enough to put this story across and also drive home the fact that it is not too early to give thought to the importance of including PREP PRODUCTS in post-war planning, something like we have outlined in our Prep Products Bulletin.

Write for PREP PRODUCTS Bulletin

(Representatives Available in Most Sections of the Country)

NEILSON CHEMICAL COMPANY 6560 Benson St., *Detroit 7, Mich.*

(*Continued from p. 600*)

Judicious selection and proportioning of the driers are necessary, therefore, to produce a satisfactory coating. Cobalt is extensively used in white enamels because it has the least tendency to discolor the coating. On the other hand, the fast surface drying action of cobalt leads to skinning and wrinkling. This fault becomes an advantage in the production of wrinkle finishes. It can be used alone or in combination with lead.

Cobalt produces a more elastic film than manganese which produces the hardest film of the three driers. Used alone or in combination with lead, manganese is useful for colored enamels, although when used in white enamels it imparts a pinkish color.

Lead driers which are the most extensively used, although always in combination with one of the other two, produce a film that ranks in hardness between those produced by manganese and cobalt.

The amount of driers added to paint and varnish oils must be kept under certain limits for each type of oil. If too much is added, the driers defeat the purpose for which they are intended and actually retard the drying of the oils. Also, too much drier causes loss of gloss and durability in enamel coatings. When, as is often done, various oils are combined, the amount of driers used is the same as if each oil were treated separately. However, if one of the driers should be incompatible with or detrimental to one of the oils in the mixture, it should be omitted.

In addition to compounds of the three metals already discussed as driers, some other metal compounds are finding increased use as driers and for imparting certain desirable properties to the paints and varnishes now produced. Zinc drier, for instance, can be added with advantage to alkyd resin coatings to improve gloss and to reduce wrinkling in baked finishes. Iron drier, although it imparts a dark coloration, is a good addition to dark baking finishes and it is helpful in eliminating tackiness from products containing fish oils. The chalking of some types of finishes is reduced considerably by the addition of chromium drier, and copper and mercury driers are sometimes added to paints when resistance to fungus growths is of importance.

Manufacturers' Literature

Respirators

Pulmosan Safety Equipment Corp., Dept. OF, 176 Johnson St., Brooklyn, N. Y., has issued a ten-page folder describing its various respirators, hoods, helmets, etc. Each item is illustrated and described and its uses given. A feature of the folder is an alphabetical list of gases and vapors and the type of respirator recommended for each.

Copies may be obtained by writing to the company at the above address.

Insulating Varnish

Information on the use and characteristics of Synthite PG-1 Clear Baking Varnish, an electrical insulating material, is contained in a new six-page, illustrated folder issued by *John C. Dolph Co.*, Dept. OF, 168 Emmett St., Newark, N. J. Specifications for this varnish, which is composed of synthetic resins and vegetable drying oils, are given along with complete directions for its use, including vacuum impregnation, on transformers, coils and other similar electrical units. Characteristics of the varnish such as its ability to cure thoroughly without trapping solvents are also given.

A copy of the folder will be sent on request to the company at the above address.

Baking Ovens

Bulletin No. 51 describing finish baking and drying ovens for enamels, lacquers, japans and other organic finishing materials has been published by *Despatch Oven Co.*, Dept. OF, Minneapolis, Minn. This bulletin is devoted in part to descriptions of components of baking and drying ovens such as heating units, wall panels, etc., made by the manufacturer. Methods of heat distribution are also discussed and a number of drawings show various styles of ovens. The booklet contains a number of pictures of actual installations for drying and baking finishing materials on steel drums, wire and cable, stove parts, motor frames and parts and similar items.

Specification Sheets

Testor Chemical Co., Dept. OF, Rockford, Ill., has issued a folder of products sheets for United States Army, Navy and Air Force specification finishes. Each of the 37 sheets contained in the folder gives laboratory, production and application details on a wide range of government specification finishing materials including dopes, lacquers, lacquer thinners, cements, primers, enamels, wood sealers, etc. In addition to this information, the sheets give data on specific uses of the various materials, status of the specifications, etc.

Copies of the products sheets and an illustrated folder describing the production facilities of the company may be obtained by writing to the given address.

"Fire and How To Fight It"

A new departure in company-sponsored publications is the fire-fighting booklet issued by *Walter Kidde & Co., Inc.*, Dept. OF, 140 Cedar St., New York, N. Y., entitled "Fire And How To Fight It."

This 36-page, illustrated manual answers the demand for a file-size brochure to serve as an easy reference on the subject of first-aid fire-fighting. In simple, graphic terms it describes and illustrates the fundamental facts about fires and their control, what makes them burn, the different types of fires and the proper handling of each. All the usual varieties of extinguishers, whether of Kidde or competing makes, are covered—soda-acid, water, foam, vaporizing liquid, dry compound, and carbon dioxide—and directions are given for their use and maintenance.

The latter part of the booklet is devoted to the Kidde built-in carbon dioxide extinguishing systems, including total flooding of a given space; local application to particular hazards; multiple protection of more than one fire hazard by a single battery of cylinders through directional valves; protection of rotating electrical machinery; control of fire at sea in ships, yachts and motorboats, and in airplanes. The Kidde life-raft and life-belt inflation equipment now in use all over the world is touched on, and the book closes with descriptions of the company's three types of mobile extinguishing units—the wheeled extinguishers, trailer units, and the emergency truck for fast fire-fighting and rescue work.

Business Items

Announcement of plans for the construction of two new paint plants, one in Mexico City, Mexico and the other in Sao Paulo, Brazil, was made by *George A. Martin*, chairman of the board of the *Sherwin-Williams Co.*, paint manufacturer. Recently returned from a 16,500 mile trip through Central and South America, Mr. Martin disclosed that actual work on the new projects, which are to cost approximately $1,000,000, would commence as soon as construction materials are available, probably not before the close of the war. Meanwhile, the company will continue to operate its plants in Havana and Buenos Aires.

Page N. Hamilton, former sales representative of *Harshaw Chemical Co.*, in the New York area, has resigned his position with that company to open an office at 205 East 42nd St., New York, to deal in a general chemical business.

W. B. Lawson, Inc., Cleveland, Ohio, sole distributor for *Ferro Drier & Chemical Co.*, has appointed Mr. Hamilton sales agent for northern New Jersey, metropolitan New York, and New England for Ferro products, viz., metallic soaps for the grease and textile industries and driers for paint and varnish manufacturers.

Mr. Hamilton will represent also W. B. Lawson, Inc., distributors of industrial chemicals, oils, and non-ferrous metals in the same territory.

Hercules Powder Co. has announced the expansion of its Synthetics Department to an operating department, with *Dr. W. M. Billing* as general manager.

The Synthetics Department, organized by Hercules in 1936, has pioneered in the development of new resins derived from rosin, production and sales of which have grown to such a point that they can only be handled by a full-scale operating department. Beginning in 1936 when the group had no plants or sales offices and but a small personnel, it has grown until it has three manufacturing plants, located at Mansfield, Mass., Brunswick, Ga., and Hattiesburg, Miss., and sales offices and distributors located in many cities throughout the country.

"The resins developed since the creation of this department, which were gaining recognition in normal peacetime industrial applications, have been called for in even greater volume for war materials," Dr. Billing said. "The properties that make them so acceptable today should result in their widespread use after the war. Industries which use these synthetic products are the paint, varnish, lacquer, adhesives, paper, printing inks, textile and other industries.

Aluminum Industries, Inc., Cincinnati, Ohio, manufacturer of Permite Products, has announced the appointment of *Michael Malachi Carmody* as sales manager of its Paint Division. In this capacity, Mr. Carmody will have charge of the sales of Permite Ready-Mixed Aluminum Paints and Permite Industrial Finishes.

Since 1923 Mr. Carmody has been associated with the manufacturing and selling of industrial paints and varnishes, and during the past three years has specialized on servicing industries producing all types of equipment under the armament program. Prior to joining Aluminum Industries, he was assistant manager of engineering service for the Thresher Varnish Co. of Dayton, Ohio, a subsidiary of the Pittsburgh Plate Glass Co., after having served that company as an industrial salesman and paint sales engineer for four years. Before that, Mr. Carmody was associated with the Bradley & Vrooman Co. and the Bradley-Hurtz Co., both of Chicago, Ill.

From December 6, 1917, to August 18, 1919, Mr. Carmody served in the U. S. Navy.

Leland Lyon, president of *Atlas Powder Co.*, has announced that *J. K. Weidig* has been appointed general manager of the Cellulose Products Department of Atlas Powder Co., including Zapon Division, manufacturer of protective coatings, and Zapon-Keratol Division, manufacturer of book cloths, upholstery fabrics, and numerous other coated fabrics and materials.

Mr. Weidig joined Atlas in February, 1941 when it acquired The Keratol Company of Newark, N. J., of which Mr. Weidig had been a director and general manager. In December, 1942 Mr. Weidig became assistant general manager of Zapon-Keratol Division.

Mr. Weidig was born in Newark, New Jersey and educated in the public schools of that city and at Princeton University where he studied special engineering. Mr. Weidig is married, has two sons, one of whom is in the U. S. Army and the other in the U. S. Marines Reserves.

Mr. Lyon has also announced that *E. H. Bucy*, recently with the War Production

J. K. Weidig

Board, has been appointed assistant general manager of the Cellulose Products Department.

Mr. Bucy became technical director of Zapon Brevolite Division of Atlas Powder Co. at Chicago in 1933. In 1934 he came to Zapon Division at Stamford also as technical director. In January, 1942 he was selected a consultant to the War Production Board in Washington, and in August of 1942 became Chief of the Protective Coatings Section of the War Production Board. He remained in this capacity until April 1, 1943, and is now assuming his new duties at Stamford.

Mr. Bucy originally joined the Waukegan Chemical Co. in 1921, becoming chief chemist after a career of laboratory and sales activities. He was with this company and its successor company until it was acquired by Atlas Powder Company.

Mr. Bucy in his career with Zapon has pioneered in many new phases of finishing chemistry and application. He has read a number of papers before groups and societies in the finishing field.

E. H. Bucy

NEW EQUIPMENT AND SUPPLIES

LATEST COMMERCIAL DEVELOPMENTS IN ORGANIC FINISHING

Hot Lacquer Process

The lacquer industry will be interested to learn that for the duration free licenses to use the Commercial Solvents' "Hot" Lacquer Process (U. S. Patent No. 2,150,096) are being granted to producers of war materials. Convenience and marked saving in application costs are said to have encouraged the adoption of this process by manufacturers of aircraft, furniture and various other products of metal, wood or porous materials such as wallboard.

The "hot" lacquer process utilizes a novel lacquer technique based on the fact that lacquer can be thinned by heating instead of by the addition of thinner. For example, a lacquer sprayed at 150-160°F. will contain 50-70% more solids than a conventional lacquer sprayed at room temperature. Also, properly formulated "hot" lacquers can be applied in thicker liquid coats than conventional lacquers with the result that the number of coats required to give any desired thickness of film can be reduced. In some cases attractive one-coat lacquer finishes can be obtained with this new process, it is said.

When properly formulated and applied, the flow characteristics of "hot" lacquers are excellent and blushing troubles are lessened. All of these advantages may be obtained without sacrificing the rapid-drying and other valuable characteristics of cellulose ester lacquers.

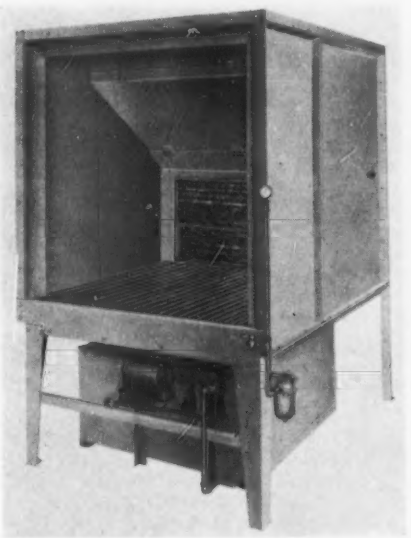
Inquiries concerning the "hot" lacquer process should be addressed to lacquer manufacturers as special lacquers and heating equipment are required when using this process.

Substitute Coatings

Announcement of a series of coatings by the Watson-Standard Co., Dept. OF, Pittsburgh, Pa., illustrates how America is rapidly becoming self-sufficient through the development of substitutes for war-scarce materials.

The new coatings contain no tung oil, phenolic resin, or other critical material, yet are said to be the equal, and, in some respects, better than similar pre-war finishes. The ingredients used are available from easily accessible sources; for instance, the resin is a petroleum by-product that can be provided in ample quantities by petroleum refineries, while the oil comes from unrestricted sources.

It is claimed that coatings made from these materials are adaptable to extreme fabrication and process well. The company recommends them particularly for home canning closures.



New Spray-Degreasing Booth

The new spray-degreasing booth illustrated has been announced by The DeVilbiss Co., Dept. MF, Toledo, O.

In view of the shortage of organic solvents of the type used in degreasing operations, one of the most important of the advantages claimed for this new spray-degreasing booth is the ability to hold solvent loss to barest minimum. Engineered for safe operation, even when hazardous materials of high volatility and very low flash-point are used, the new unit also removes fumes more thoroughly and delivers a more forceful, harder-driving solvent spray, according to reports.

The booth is made in 14, 16, and 18 gauge steel. Sizes vary according to the requirements of the products to be handled.

New Plastic Paint Ends Constant Repainting

Interiors, exteriors, concrete floors, etc., can be coated with Calumet Liquid Plastic Paint which expands and contracts with changing temperatures. Cracks, splits and joints of reasonable size are reported to remain sealed by this plastic bond, thus outlasting three or more coatings of ordinary paint.

The painted surface is said to be non-porous and impervious to penetration of dirt and moisture. It is washable by rain, hose or sponge.

The paint is applied by brush or spray. It is sold direct by Calumet Plastic Co., Inc., Dept. OF, 4732 Calumet Ave., Hammond, Ind.

Wrinkle Finishes

A new line of wrinkle finishes, containing no Chinawood oil, has been developed by Maas and Waldstein Co., Dept. OF, 438 Riverside Drive, Newark, N. J.

These new finishes closely resemble the standard wrinkle finishes, the manufacture of which is now restricted by government order to a few special applications and soon will be entirely prohibited, because of the Chinawood oil shortage.

According to the manufacturer, the new finishes form hard, durable coatings, cover rough metal surfaces effectively in a single coat, and are applied in regular wrinkle patterns by the same methods. They are obtainable in a full range of colors.

Stripping Lacquer

"Protektol," a new, transparent stripping lacquer for the protection of polished or easily marred metal, glass or ceramic surfaces, has been announced by Ault and Wiborg Corp., Dept. OF, 75 Varick St., New York, N. Y.

Basically a water-white liquid plastic, this stripping lacquer may be obtained in transparent red, blue and green and in the yellow-green of zinc chromate primer in a special rust inhibiting type. It is said to be easily removed and to offer the advantage of allowing the article to which it is applied to be seen or inspected through the film.

Protektol is supplied ready for use but may be adjusted in viscosity by the use of Protektol Reducer to suit variable conditions and equipment. It may be applied by any of the usual methods. When applied in normal film and under normal conditions, it dries to touch in five minutes, dries to handle in fifteen minutes and will strip in thirty minutes. It may be reclaimed.

Water-Thinned Paint Vehicle

M-3 Products Co., Dept. OF, 754 Humboldt St., Brooklyn, N. Y., is the manufacturer of M-3 vehicle, an oleoresinous emulsion vehicle of the type in which the water goes into the oil. Paints made of this type of vehicle are said to possess excellent adhesion and washability and to produce a gloss finish. It is also said that such paints are unusually easy to apply, are non-flammable and non-penetrating and possess good hiding capacity. Coverage is stated to be 550 to 750 square feet per gallon depending on the surface being painted.

Glossmeter

Photovolt Corp., Dept. OF, 95 Madison Ave., New York, N. Y., is the manufacturer of the Photoelectric Glossmeter, an instrument designed for measuring the specular gloss of finished surfaces. The operation of the instrument is said to be simple and convenient and to require no special training on the part of the operator. The search unit is first standardized to give a reading of 92.5 for polished black glass. It is then placed on the surface to be tested and the needle directly indicates the gloss in terms of an ideal completely reflecting mirror.

The Glossmeter is available in two models, one operated by dry-cell batteries which are housed in the instrument casing and the other by 105-125 volt, 50-60 cycle alternating current or by storage battery.

Both models are self-contained and built into a portable housing with cover and carrying strap. They are said to be rugged and shock-proof so that no special care is necessary in operating, carrying or shipping. Surfaces to be measured for gloss can be of any size and measurements may be made in rapid succession. The Glossmeter is portable and will be found valuable in the laboratory as well as in production, in the field and in test fence work.

Rust-Resistive Paint

L. Sonneborn Sons, Inc., Dept. OF, 88 Lexington Ave., New York, N. Y., is the manufacturer of S. R. P. Rust-Resistive Paint, a finishing material whose formula includes an active corrosion inhibitor of the chromate type and an inert, flaky iron ore (micaceous hematite) dispersed in a specially treated oil vehicle. This material is recommended for both interior and exterior applications where resistance to weather extremes, light, heat, gases, alkalis, sea water or acids is a factor.

It is claimed that S. R. P. Rust-Resistive Paint penetrates through and combines with rust to make a firm and lasting bond with the metal underneath, that it puts to an end the further formation of rust that has already started and that it forms a non-porous and impermeable coating which is highly resistant to corrosion. No special preparation other than wire brushing to remove loose scale or foreign matter is required. Firm rust need not be removed.

S. R. P. No. 75 primer in red and No. 87 finish coat in red and black are available. Both materials cover 500 to 600 square feet of surface per gallon and may be brushed or sprayed. If desired, any suitable metal finish coat may be applied over S. R. P. No. 75 primer.

Wrinkle Finish

Standard Varnish Works, Dept. OF, 2600 Richmond Terrace, Staten Island, N. Y., has developed a wrinkle finish, Rincolin, made with linseed oil.

According to the manufacturer, this wrinkle finish is free of Chinawood, oiticica and castor oils. It is said to give the same size and type of uniform dull wrinkle with heavy or light coats and to be free of dull spots and fish eyes regardless of how it is sprayed. It is also said that this finish always remains flexible and will not chip or become brittle. In case of a mar or defect which would cause rejection, a second coat can be sprayed over the first coat. It may be obtained in all colors.

NoDrip Coating

NoDrip, a plastic cork coating introduced as a preventive of condensation drip, is being recommended for application to all piping and other metal equipment to prevent rust and corrosion and to prolong the life of all metal surfaces. In addition to preventing condensation drip, this material is said to preserve metal from rust and form a moisture proof insulation-type coating that is impervious to acid and alkali. It can be applied with brush, trowel or spray to any flat or rounded surface.

A copy of a new illustrated folder describing NoDrip and showing its applications in various industries may be obtained by writing to the manufacturer, J. W. Mortell Co., Dept. OF, Burch St., Kankakee, Ill.

Infra-Red Reflectance Standards

To meet the increasing demand for infrared reflectance standards, the Stewart Research Laboratory of Washington, D. C., has made available standards for immediate delivery. These standards are permanent and washable. They are metal, coated with a durable baked enamel, and are sold in sets corresponding to the three levels of infrared reflectance used in U. S. Army Specification No. 100-12, which are as follows:

Panel No. 1	24.7%
Panel No. 2	37.4%
Panel No. 3	56.6%

The standards are calibrated for the Wratten 89-A filter and are accurate to ± 0.5%. They can be used for direct photographic comparison or for reflectometric measurements.

With every set of panels there is included a pamphlet giving a full explanation of the standard procedures for measuring infra-red reflection. This pamphlet also discusses the advantages and disadvantages of each method, giving a comparison of the filters commonly used. Also included are procedures for the proper use of the Stewart Infra-Red Reflectance Standards. No priority is required.

Prices and detailed information may be obtained by writing to the Stewart Research Laboratory, Dept. OF, 1340 New York Ave., N.W., Washington, D. C.

New Bomb Finish

Zapon Division, Atlas Powder Co., Dept. OF, Stamford, Conn., has announced that it has perfected Zapon S-631, a new bomb finish which meets U. S. Army ordnance specification No. AXS-946.

The new formulation was especially developed to meet the mandatory requirements for finishing bombs and heavy ammunition which became effective July 1, 1943. The company's announcement stated that the product is now available for this important job.

Safety Cleansing Compound

Den-tex, a new compound designed to remove lacquers, dopes and paints from the hands without the use of explosive solvents, has been developed by Dennis Chemical Co., Dept. OF, 2701 Papin St., St. Louis, Mo.

This material is simply worked into the paint or lacquer on the hands and then rinsed off with water.

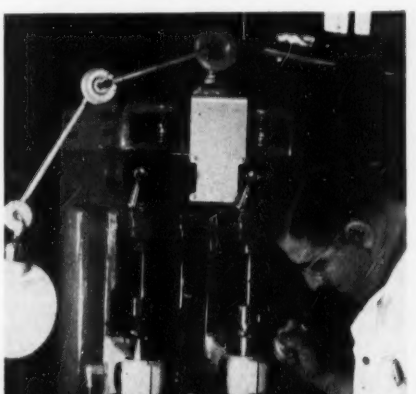
"Three-dimensional" Painting

"Three-dimensional" painting, a system developed by DuPont, has been adopted by United Air Lines for all shops, with the initial use in the machine shop at Cheyenne, Wyo. Adoption of the paint system is in accordance with United Air Lines' general program of improved maintenance and safety methods—improvements which have been accelerated to keep pace with the increased tasks of war time air transportation.

Simply stated, "three-dimensional" painting is the use of various colors of paint on various parts of machines to produce the best light reflection qualities, to emphasize safeguards and to spotlight points of operation.

In its machine shop, United Air Lines has adopted light buff color for points of operation such as control levers and moving parts. Gray has been used for other parts such as the main body and sections removed from the worker's immediate point of operation. Orange has been applied to safety devices such as belt and gear guards.

Greater operating efficiency and accuracy, less fatigue and fewer accidents are said to be some of the benefits already noted as a result of the painting system. Although light colored paints such as described above are used, experience indicates that the machines are kept cleaner.



United Air Lines Photo

"Three-dimensional" painting system developed by DuPont and applied to multiple drill press. The operating parts are painted buff and the balance of the machine gray.

THIS IS THE WHEEL MR. JONES*

● Maybe you were stumped by grinding jobs before, but they won't worry you any more.

300 shapes and sizes—every grade and grain—there is a Chicago Mounted Wheel custom-built to take on *any* grinding problem. Each wheel is a whirling point of power that turns your jobs out smooth—and in a hurry.

PROMPT DELIVERY

Action is the keynote from the moment your order comes in. Our wartime set-up concentrates on mounted points and grinding wheels 3" in diameter and under. —Production is stepped up and keeps pace with demand. Another advantage to you is our central location.

NEW CATALOG—Shows Chicago Mounted Wheels in actual colors, also portable electric tools and time-saving accessories.

CHICAGO WHEEL & MFG. COMPANY

America's Headquarters for Mounted Wheels and Small Grinding Wheels.

1101 W. Monroe St., Dept. MF
Chicago, Illinois

*Half a century of specialization has established our reputation as *the* small wheel people of the abrasive industry.

TEST WHEEL FREE—Tell us the job, type grinder and size wheel you use and we'll send one prepaid.

☐ Send Mounted Wheel Catalog wt 9
☐ Free Wheel. Size.....
☐ Also interested in Grinding Wheels

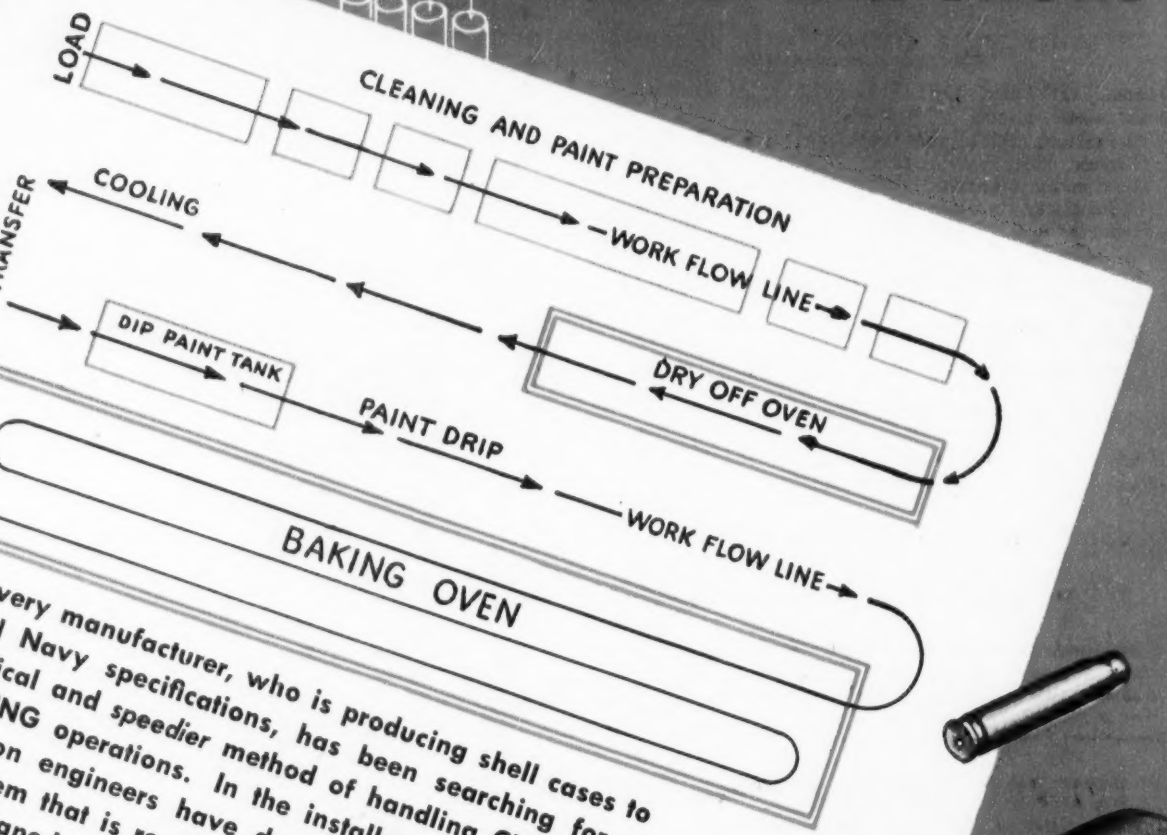
Name.....

Address.....

MAHON

"Built-for-the-Job"

FINISHING SYSTEM FOR SHELL CASES



Almost every manufacturer, who is producing shell cases to Army and Navy specifications, has been searching for a more practical and speedier method of handling CLEANING and FINISHING operations. In the installation diagrammed above, Mahon engineers have developed a cleaning and finishing system that is readily adaptable to any plant layout. It is designed not only to expedite production but to do it with less handling and at less expense. The several stages of—cleaning—processing—drying—painting—baking—have been expertly engineered and co-ordinated into a compact, close-coupled system that speeds the work through in a steady, continuous flow. No lag. No production slowdown.

It is to the advantage of every shell case manufacturer to know the complete particulars of this Mahon development. Phone—wire—or write—without delay.

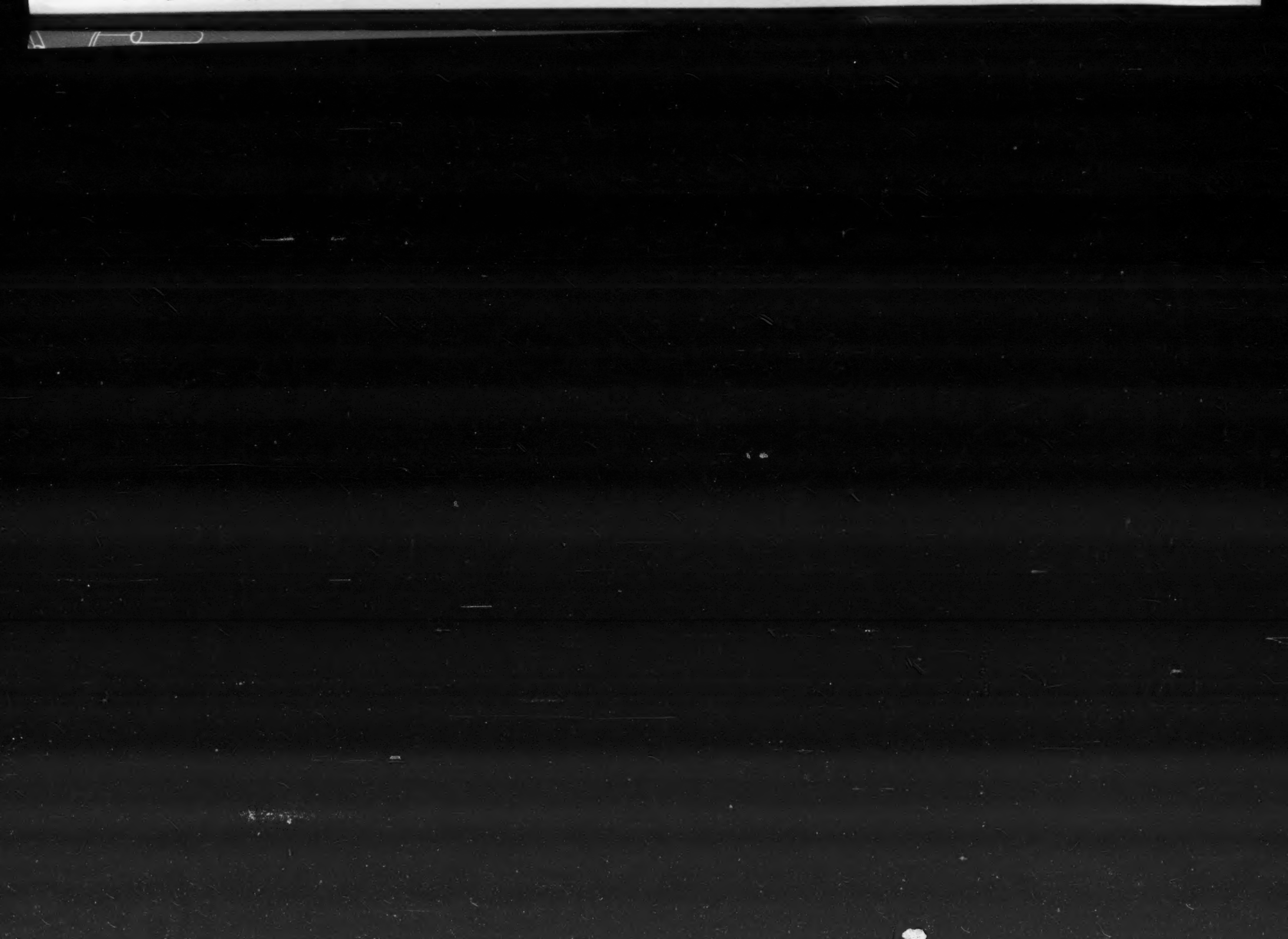
HANDLES ANY SIZE CASE

This Mahon Finishing System can be adapted to handle the production of any size shell case—from smallest to largest.

THE R. C. MAHON COMPANY

DETROIT — CHICAGO

Designers and Manufacturers of Metal Cleaning Machines, Rust Proofing Machines, Hydro-Filter Spray Booths, Ovens of All Types, Filtered Air Supply Systems, Hydro-Foam Dust Collectors—and Many Other Units of Special Production Equipment—Including Complete Finishing Systems.



Supply Prices, August 31, 1943

Anodes

Prices are f.o.b. shipping point on quantities of from 500-999 lbs. for copper, brass and zinc. For nickel, prices are for quantities from 500-2,999 lbs.

COPPER: Cast, elliptical, 15" and longer ..... 25⅛c. per. lb.
Electrolytic, full size, 22⅞c; cut to size .... 22⅞c. per lb.
Rolled, oval, straight 15" and longer 23¼c. per lb.; curved ..... 24¼c. per lb.
BRASS: Cast, 80-20, elliptical, 15" and longer ..... 23⅝c. per lb.
ZINC: Cast, 99.99, 16" and over ..... 16¼c. per lb.

NICKEL: 95-97 cast, elliptical 46c. per lb., 99% plus cast 47c.; rolled, depolarized ..... 49c. per lb.
FOREIGN SILVER: Rolled, .999 fine per Troy (100 oz. lots) 49½c. per oz.
TREASURY SILVER ..... 75⅝c. per. oz.

Chemicals

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone, C.P., dms., l.c.l.	lb.	.09
Acid, Acetic, glacial, 99.5%, bbls.	lb.	.0915-.094
Boric, tech., 99.5% gran., bbls.	lb.	.063
Chromic, 99%, dms., l.c.l.	lb.	.1675-.1825
Hydrochloric (muriatic) 20°, cbys.. wks.	lb.	.0175
Hydrochloric (muriatic) C.P., 6 lb. btls.	lb.	.19
Hydrofluoric, 30% rubber dms.	lb.	.08-.09
Hydrofluoric, 48%, rubber dms.	lb.	.12
Nitric, 36°, cbys. 1-9, wks.	lb.	.0595
Nitric, 42°, cbys c.l., wks.	lb.	.065
Oleic (Red Oil), dms.	lb.	1325-.1425
Oxalic, small quantities	lb.	.125
Phosphoric, 75%, c.l., cbys.	lb.	.0510-.0535
Stearic, double pressed, bgs.	lb.	.1578-.1678
single pressed, bgs.	lb.	.1538-1638
triple pressed, bgs.	lb.	.1858-.1958
Sulfuric, 66°, cbys., c.l., wks.	lb.	.015
Alcohol, Amyl (Fusel oil, ref'd), l.c.l.	lb.	.151
Butyl-normal, l.c.l.	lb.	.1930
Denat., S.D. #1, 190 pf., bbls., c.l., wks.	gal.	.62
Diacetone, tech., dms., l.c.l.	lb.	.115-.14
Methyl, (Methanol), synthetic, dms., l.c.l.	gal	.37
Propyl-Iso, 99%, dms. l.c.l.	gal.	.47
Propyl-Normal, dms., wks.	gal.	.67-.70
Alum, ammonia, gran., bbls., wks.	lb.	.04
Potash, gran., bbls., wks.	lb.	.0425
Aluminum Sulfate, iron-free, bgs., c.l., wks.	lb.	.02-.0210
Ammonia, aqua, 26°, cbys.,	lb.	.0525
Ammonium, chloride (sal-ammoniac), white granular, bbls., wks.	lb.	.0515
Ammonium, Sulfate, dms. bulk	ton	$29.20
Sulphocyanide (thiocyanate) tech., bbls.	lb.	.17
Antimony Chloride (butter of antimony), sol., cbys..	lb.	.17
Arsenic, White, powd., kgs., l.c.l.	lb.	.0475
Barium Carbonate, pptd., bgs., l.c.l., wks.	lb.	.03
Benzene (Benzol), 90%, dms., wks.	gal.	.20
Borax, tech., bgs.	ton	$61.00
Butyl Lactate, dms.	lb.	.205
Cadmium Oxide, l.c.l., bbls.	lb.	.95
Calcium Carbonate (Pptd. chalk), c.l., wks.	lb.	.02
Calcium Chloride, flake, paper bgs, 5-ton lots	ton	$28.50-$41.00
Carbon Tetrachloride, l.c.l., 52½ gal. dms.	gal.	.80
Cobalt Sulphate, dms.	lb.	.65
Copper, Acetate (verdigris), bbls.	lb.	.26-.50
Carbonate, 52-54%, bbls.	lb.	.195-.205
Cyanide. tech., 100 lb. bbls.	lb.	.34-.38
Sulfate, 99%, cryst., bbls., c.l., wks.	lb.	.05
Cream of Tartar (potassium bitartrate), kgs.	lb.	.585
Crocus Martis (iron oxide), bbls., c.l.	lb.	.09
Dextrin, white, bags, l.c.l., F.O.B. Chicago	lb.	.0415
Diethylene Glycol, dms., l.c.l., wks.	lb.	.155
Emery (Turkish)	lb.	.08
Ethyl Acetate, 85-90%, l.c.l., dms.	lb.	.122-.125
Ethylene Glycol. l.c.l., dms.	lb.	.11
Monobutyl ether. dms.. l.c.l., wks.	lb.	.175-.205
Gold, Chloride, yellow, 4 oz. btls.	oz.	$18.75-$19.00
Cyanide, potassium 41%, btls., wks.	oz.	$14.20-$14.95
Cyanide, sodium (46%)	oz.	$17.10
Gum, Arabic, white, bgs.	lb.	.33-.35
Hydrogen Peroxide, 100 vol., cbys.	lb.	.16-.185
Iron Chloride (ferrous), cryst., bbls., l.c.l., f.o.b., Midland, Mich.	lb.	.035
Iron Chloride (ferric), cryst.. bbls.	lb.	.05-.08
Iron Sulfate (Copperas), cryst.. bbls., 1-4 wks.	lb.	.02
Lead, Acetate (Sugar of Lead), cryst., bbls.	lb.	.125
Oxide (Litharge), com., powd., bbls.	lb.	.09
Lead, White, dry, bbls.	lb.	.085
Magnesium Sulfate (Epsom Salts), tech., bbls.	lb.	.019
Mercury Bichloride (Corrosive Sublimate), cryst.	lb.	$2.39
Mercury Oxide, NF, powd., dms.	lb.	$3.26
Mineral Spirits, tanks	gal.	.10
Naphtha, V. M. & P.. tanks	gal.	.11
Nickel, Carbonate, dry, bbls.	lb.	.36-.365
Chloride, bbls.	lb.	.18-.20
Salts, bbls.	lb.	.13-.135
Paraffin, refined, 123-125 A.M.P.	lb.	.052
Perchlorethylene, dms., l.c.l.	lb.	.0832-.085
Potash, Caustic, 88-92%, flake, wks., c.l.	lb.	.07
Potassium, Bichromate, casks	lb.	.0975-.10
Carbonate (potash) calc., wks., dms.	lb.	.065
Cyanide, dms., wks.	lb.	.55
Nitrate, rfd., gran., bbls.	lb.	.0835-.086
Permanganate. tech., dms., wks.	lb.	.1975-.2025
Phosphate, dibasic, ¼ lb. btls.	lb.	.91
Pumice, ground, 1½ F. & coarser, bbls., wks.	lb.	.0378-.045
Quicksilver (Mercury), f.o.b. West Coast, 76 lb. flasks, net	flask	$191.00
Rochelle Salt, cryst., bbls.	lb.	.44-.47
Rosin, gum, D, dms., dock	lb.	.039
Silver, Chloride, dry, 50 oz. lots	oz.	.455
Cyanide, 100 oz. lots	oz.	.415
Nitrate, 100 oz. lots	oz.	32⅝
Sodium, acetate, flake, gran., powd., 60%, bbls., l.c.l.	lb.	.055-.06
Bisulphite, powd., bbls., l.c.l., wks.	lb.	.035-.036
Bicarbonate, tech., bbls., l.c.l.	lb.	.0205
Bichromate, l.c.l., wks.	lb.	.075-.0775
Carb. (soda ash), light, 58%, bags, l.c.l.	lb.	.0213
Citrate, U.S.P., gran., dms.	lb.	.24-.29
Cyanide, 96%, dom., 100 lb. dms.	lb.	.145-.15
Hydroxide (caustic soda) 76%, flake, l.c.l.	lb.	.0355
Metasilicate, gran., 1-9 bbls.	lb.	.033-.0355
Nitrate, rfd.. gran., bbls., wks.	lb.	.0375-.04
Nitrite, 96-98%, dom., bbls., l.c.l.	lb.	.089-.119
Orthosilicate, anhyd., l.c.l.	lb.	.0545-.0585
Phosphate, dibasic, cryst., bags, l.c.l., wks.	lb.	.0295-.0345
Phosphate, tribasic, kegs, l.c.l., wks.	lb.	.0415
Pyrophosphate, anhyd., bags, l.c.l., wks.	lb.	.054-.066
Sesquisilicate, dms., l.c.l.	lb.	.0405-.043
Stannate, dms.	lb.	.325-.365
Sulfate, anhyd., bbls., wks.	lb.	.022-.024
Sulfide, cryst., bbls., l.c.l.	lb.	.029-.0315
Sulfocyanide, C.P., dms.	lb.	.55-.65
Thiosulfate, cryst., bgs., wks., l.c.l.	lb.	.025
Sulfur, Flowers, U.S.P., l.c.l.	lb.	.034-.0355
Toluene (Toluol), 2°, ind., dms.	gal.	.33
Trichlorethylene, dms., l.c.l.	lb.	.085
Tripoli, air-floated, bgs., c.l., wks.	ton	$21.50
Wax, Bees, yellow, crude	lb.	.4475
Carnauba, refined, bgs.	lb.	.7775-.90
Spermaceti, blocks	lb.	.26-.27
Whiting, chalk, l.c.l.	ton	$20-$24
Xylene (Xylol), ind., returnable dms., wks.	gal.	.32
Zinc, carbonate, tech., bbls.	lb.	.14-.20
Cyanide, kegs, wks.	lb.	.33-.37
Chloride, tech., gran., dms., c.l., wks.	lb.	.0575
Dust, bbls.. l.c.l., wks.	lb.	.1135
Oxide, lead-free, bgs., l.c.l.	lb.	.075
Sulphate, cryst., bgs., l.c.l.	lb.	.0435

BUSINESS WANTS For Sale—Equipment, Etc.

Display Advertisements, One Column Wide, $6 per inch, Each Insertion

SITUATIONS OPEN

PLATING FOREMAN

Situation Open—Working Plater Foreman experienced in Zinc, Cadmium, Nickel, Chrome, Tin, Silver, Gold, etc. Also preferable, Barrel Plating experience in all finishes, Lacquering, Burnishing, and Acid Dipping. Wages no object. Permanent position for right man even after the war.

INDUSTRIAL PLATING CO.
772-6 Communipaw Ave., Jersey City, N. J.

FOREMAN

Situation Open — Supervisory Foreman for Electro Plating—Polishing—Painting in a Job Shop doing War Work located in Middle West. Give experience, ability, references.
E. R., care Metal Finishing, 11 West 42nd St., New York 18, N. Y.

WANTED

Man with Hard Chromium Plating experience. Write, giving age, draft status, experience and salary desired. Excellent opportunity for right man. Address W. A., care Metal Finishing.

CHEMICAL ENGINEER

Situation Open—Electro Chemical Engineer experienced in electrolytic copper operation or electrolytic stripping of copper clad or tin clad material. Copper Clad, care Metal Finishing, 11 West 42nd St., New York 18, N. Y.

SERVICE MEN

TECHNICAL SALES SERVICE MEN—for servicing metal cleaning chemicals to war plants in metal processing industry, chemical or technical background helpful. Salary while training.
Box Sept. 1
care Metal Finishing, 11 W. 42nd St., New York 18, N. Y.

BUFFER AND POLISHER

Situation Open—A first class buffer and polisher in a large plating shop where defense work is done. This is a permanent job for a first class man—good wages—also post-war work. Reply to
Box 1640
care Metal Finishing, 11 W. 42nd St., New York 18, N. Y.

SILVER PLATER

SITUATION OPEN: A first-class silver plater, in all its branches.
Creutz Platers, Inc., Third & Vine Sts., Cincinnati 2, Ohio.

BUSINESS WANTS For Sale—Equipment, Etc.

Display Advertisements, One Column Wide, $6 per inch, Each Insertion

FOR SALE

(AVAILABLE FOR IMMEDIATE SHIPMENT)

3—5000/2500 AMPERE, 6/12 VOLT, A. P. MUNNING CO. "OPTIMUS" Motor Generator Sets. Full Panel-Board Arrangement. Excellent Condition.

3—5000/2500 AMPERE, 6/12 VOLT, EAGER ELECTRIC CO. Motor Generator Sets. Excellent Condition.

1—5000 AMPERE, 6 VOLT, JANTZ & LEIST Motor Generator Set. Full Panel-Board Arrangement. Excellent Condition.

1—4000/2000 AMPERE, 6/12 VOLT, EAGER ELECTRIC CO. Motor Generator Set. Excellent Condition.

1—2500 AMPERE, 6 VOLT, JANTZ & LEIST Motor Generator Set. Full Panel-Board Arrangement. Excellent Condition.

1—2500/1250 AMPERE, 6/12 VOLT, ZUCKER, LEAVITT & LOEB Motor Generator Set. Full Panel-Board Arrangement. Excellent Condition.

1—2000 AMPERE, 6 VOLT, HANSON & VAN WINKLE CO. Motor Generator Set. INTERPOLE DESIGN. Separately Excited. Excellent Condition.

1—1500/750 AMPERE, 6/12 VOLT, CONNECTICUT DYNAMO & MOTOR CO. Motor Generator Set. Excellent Condition.

1—1500/750 AMPERE, 6/12 VOLT, COLUMBIA Motor Generator Set. Excellent Condition.

1—1000 AMPERE, 6 VOLT, IDEAL ELECTRIC CO. Motor Generator Set. Excellent Condition Throughout. Full Panel-Board Arrangement.

1—1000 AMPERE, 8 VOLT, JANTZ & LEIST Motor Generator Set. Excellent Condition.

1—1000 AMPERE, 6 VOLT, JANTZ & LEIST Motor Generator Set. Excellent Condition.

1—800/400 AMPERE, 6/12 VOLT, EAGER ELECTRIC CO. Motor Generator Set. Full Panel-Board Arrangement. Excellent Condition.

1—500 AMPERE, 30 VOLT, WOTTEN ELECTRIC CO. Motor Generator Set for Anodizing. Full Panel-Board Arrangement. Excellent Condition.

1—NEW LASALCO, INC., SINGLE No. 2, MOTOR-DRIVEN BURNISHING BARREL. No Priorities Required.

MANY OTHER SIZES IN STOCK

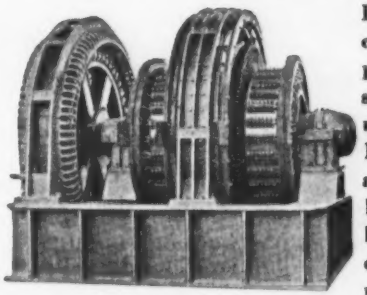
BAIRD & ABBOTT—Burnishing and Tumbling Barrels. Polishing Lathes, Rheostats, Ammeters, Blowers, Tanks, Polishing Wheels and many other items for the Plating and Polishing Department.

WRITE FOR DETAILS

M. E. BAKER COMPANY

143 Sidney St. **Cambridge, Mass.**

REBUILT AND GUARANTEED
Polishing and Plating Equipment



Largest and most complete stock of plating generator sets in America, too numerous to list, 100 amperes to 7500 amperes, 6/12 volts. Rheostats, Tumbling, Burnishing and Mechanical Plating Barrels.

Polishing & Buffing Lathes—Belt Drive, Motor Drive and Multi "V" Belt Drive.

Blowers, all sizes, belt and motor driven.

We carry a complete line of plating and polishing equipment and supplies.

Whatever your requirements may be in the plating and polishing line—call us for prices before placing your order.

WRITE — PHONE — WIRE

CLINTON SUPPLY CO.

112 So. Clinton Street **Chicago, Illinois**
Phone, Franklin 3538-3539

FOR SALE

CAnal 6-3956-7

1—50 H.P. Crocker Wheeler A.C. Motor, type SC, 220 Volt, 3 phase, 60 cycle, 850 R.P.M., complete with starter.

1—Rebuilt Motor Generator Set, 1500 Amperes, 6 Volts, complete.

BEAM-KNODEL COMPANY

195 Lafayette St., N. Y. City

FOR SALE

1250 Amp. 6V. 900 R.P.M. Hanson generator with coupled 15 H.P. motor and starter. Panel board, instruments, switches and rheostat. Newly re-built, excellent condition.

Address replies to: R.P.M., care Metal Finishing, 11 West 42nd Street, New York 18, N. Y.

FOR SALE

We carry the largest stock of slightly used Buffs in the country. All sizes in stock from 6 inches to 14 inches. All sizes loose, sewed and flannel buffs in stock. We also have all sizes slightly used emery wheels and stone wheels. Established over twenty years.

LEWIS ROE MFG. CO.

1042-1050 DeKalb Avenue, Brooklyn, N. Y.

CONTRACT FINISHING

For Results

Advertise In Metal Finishing

CHROMIUM, CADMIUM, ZINC and TIN PLATING

Chemical and Metallurgical Laboratories
Commercial Steel Treating

AGERSTRAND CORPORATION
Muskegon, Michigan

SITUATIONS WANTED

ELECTROPLATING ENGINEER

Graduate chemical engineer and metallurgist, 10 years of experience in metal finishing industry, plating all metals, patents, outstanding industrial developments; many published papers, desires production or development and research connection with a Top Flight Concern.

Address E.P.E. 5, care Metal Finishing.

FOREMAN PLATER

with 30 years experience in electroplating, buffing, polishing, lacquering, mixing and controlling all plating solutions, barrel plating, ball burnishing, automatic tanks. Excellent references available. Address Box 30, care Metal Finishing, 11 West 42nd Street, New York, N. Y.

ELECTRO-CHEMICAL ENGINEER

Many years experience in the field of hard-chromium plating of machine-parts, cutting-tools, etc., is desirous of a connection with a progressive firm in the New England area as a technical consultant. Address: Electro-chemical Engineer, care Metal Finishing, 11 West 42nd St., New York, N. Y.

SALESMAN

SITUATION WANTED—Salesman who has had over twenty years in sales and service, contacting every type of manufacture. Well versed in metal plating finishing. Can accept a position immediately. Address H. J., care Metal Finishing, 11 West 42nd St., New York.

CHEMISTS—PLATERS—POLISHERS—BUFFERS

We are receiving many inquiries for the names and addresses of executives who seek positions. Please write complete information of experience to METAL FINISHING, 11 West 42nd Street, New York 18, N. Y.

PLATING EXECUTIVE

SITUATION WANTED—Plating and anodizing superintendent with 8 years of automotive plating experience and 2 years of aircraft finishing experience available. Midwest location preferred.
F. E., care METAL FINISHING, 11 West 42nd Street, New York 18, N. Y.

INDEX TO ADVERTISERS

ODDS and ENDS

The *fungibility of silver*, mentioned in one of the paragraphs of WPB Order M-199, restricting the uses of foreign, domestic and Treasury silver, gave us a few bad moments last month. Our dictionary defined the word *fungible* as "such that one specimen or part may be used in place of another in the satisfaction of an obligation, as money, food, etc." We mentioned the word to our neighbor, who is a member of the legal profession, and he vouchsafed the information that it was a legal term and that he had never heard anyone but a lawyer use it. However, his explanation as to why such terms are employed by the legal practitioners left us unimpressed. We would still like to know why, instead of speaking of the *fungibility of silver*, the order didn't just state that foreign, domestic and Treasury silver, when mixed, could not be identified from their physical or chemical characteristics, and let it go at that.

Perhaps the author was like Merton Quirk, in the following poem by an unidentified genius, which was brought to our attention by Mr. J. Klein of Universal Slide Fastener:

REFERENCE: B and B 3e-24614
FILE: INV. FORM A62B-M-Q

As Head of the Division of Provision for Revision
Was a man of prompt decision—Merton Quirk.
Ph.D. in Calisthenics, P.D.Q. in Pathogenics
He had just the proper background for the work.

From the pastoral aroma of Aloma, Oklahoma,
With a pittance as a salary in hand
His acceptance had been whetted, even aided and abetted
By emolument that netted some five grand.

So, with energy ecstatic, this fanatic left his attic
And hastened on to Washington, D. C.
Where with verve and vim and vigor he went hunting for the Nigger
In the woodpile of the W. P. B.

After months of patient process, Merton's spicular proboscis
Had unearthed a reprehensible hiatus
In reply by Blair and Blair to his thirteenth questionnaire
In connection with their inventory status

They had written—"Your Directive when effective was defective
In its ultimate objective, and what's more,
Neolithic hieroglyphic is to us much more specific
Than the drivel you keep dumping at our door."

This sacrilege discovered, Merton fainted—but recovered
Sufficiently to write—"We are convinced
That sabotage is camouflaged behind perverted persiflage—
Expect me on the 22nd inst."

But first he sent a checker, and then a checker's checker;
Still nothing was disclosed as being wrong.
So a checker's checker's checker came to check the checker's checker
And the process was laborious and long.

Then followed a procession of the Follow-Up profession,
Through the records of the firm of Blair and Blair.
From breakfast until supper, some new super-follow-upper
Tore his hair because of Merton's questionnaire.

* * *

The file is closed, completed, though our Hero, undefeated
Carries on in some Department as before:
But Victory is in sight, not because of—but in spite of
Merton's mighty efforts in the War.

THIS PART MUST BE CLEAN TO KEEP MY MACHINE IN GOOD SHAPE

Use METALEX *in*

tumbling barrels and rotary washers

METALEX compounds have been developed and perfected by MacDermid chemists in answer to the urgent need for fast, positive solvents especially formulated for individual cleaning operations of small parts of machinery and are now available for delivery from our many points of distribution. A qualified MacDermid service engineer will be pleased to show you how to secure a perfectly cleaned small product by using these improved compounds in tumbling barrels or rotary washers and prescribe the correct solution for your use. Write describing the items that you manufacture for free data sheets.

Other Compounds for Other Problems

For over twenty years MacDermid has specialized in developing special compounds for fast, positive cleaning of basis metals believing that most products and metals need individual treatment prior to plating or finishing. The most outstanding of these are METEX compounds for cleaning aluminum, alloys, copper and brass and ANODEX compounds to be used with the ANODEX reverse current process, originated by MacDermid and now conceded to be the fastest method of electro-cleaning. Other compounds, developed for special applications are: DURODEX compounds for economical electro-cleaning. SOLVTEX and SOLVMAX water and spirit emulsion cleaners. INHIBITEX №1 and №2 for powerful, safe and economical pickling. Other compounds for unusual operations.

Write for Free Data Sheets and Folders

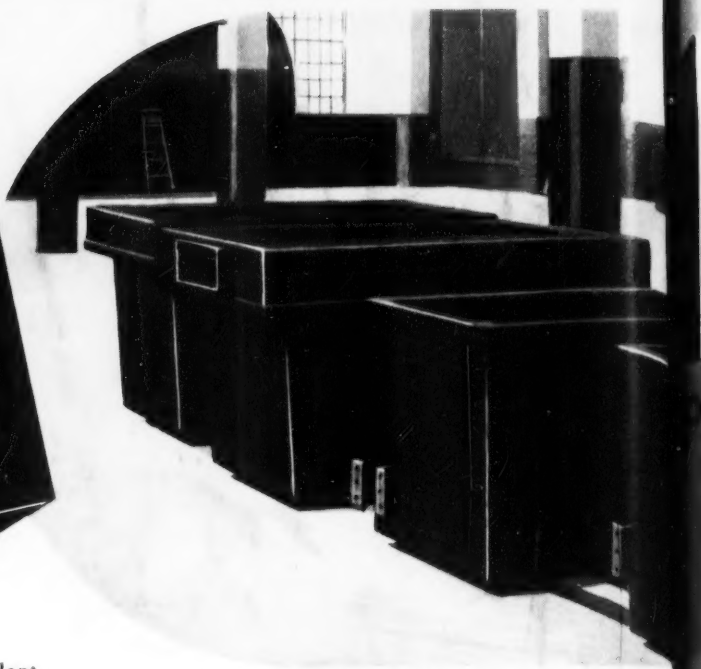
SALES AND SERVICE from COAST TO COAST
New York Cleveland Los Angeles
Chicago Detroit St. Louis
Newark Philadelphia
Toronto, Canada

MAC DERMID

INCORPORATED

WATERBURY, CONNECTICUT

HERE'S HOW TO USE TYGON *For Better Plating*

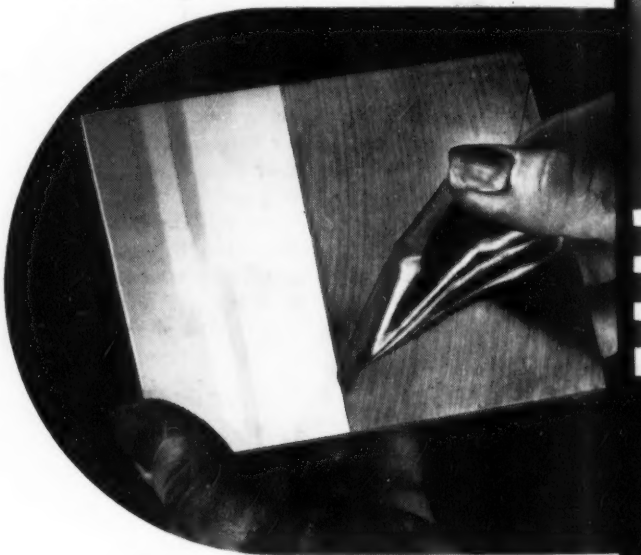


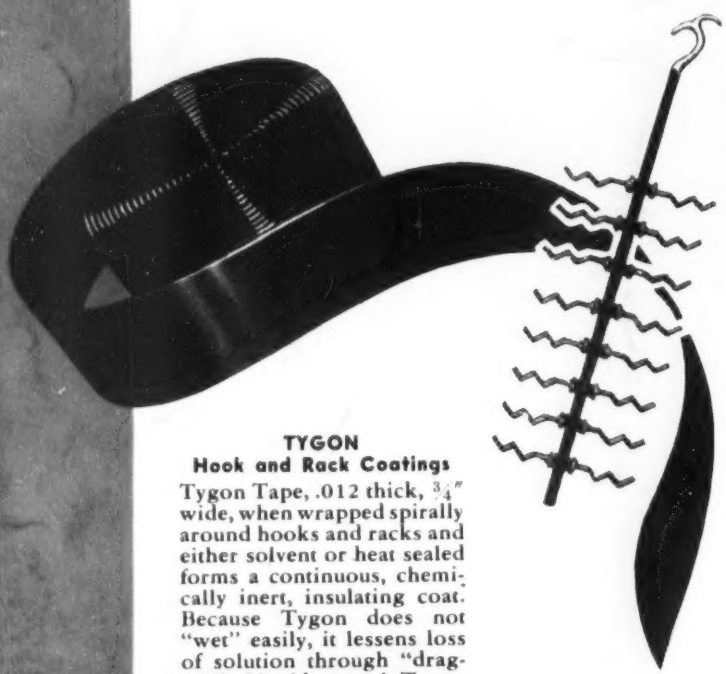
IT'S tough enough these days to run a plating plant without being faced with breakdown of equipment from corrosive attack, or too frequent recoating of hooks and racks from faulty insulation, or excessive loss of time and materials from ineffective masking solutions.

A lot of plating operators have learned they can use the various Tygon formulations to excellent advantage in minimizing these annoyances. For Tygon, the chemically inert plastic material, fits in perfectly with many plating operations. If you haven't tried Tygon — you're missing a good bet.

TYGON Tank Linings

Tygon tank linings will handle any plating solution without contamination. Possess high dielectric strength. Dense, free from pin-holes. Sturdy and tough Tygon tank linings will stand even abnormal abuse. Bond with almost integral adhesion to steel.





TYGON
Hook and Rack Coatings

Tygon Tape, .012 thick, ¾" wide, when wrapped spirally around hooks and racks and either solvent or heat sealed forms a continuous, chemically inert, insulating coat. Because Tygon does not "wet" easily, it lessens loss of solution through "drag-out". Liquid or gel Tygon formulations are also available.

TYGON Tempro-tec

Tops as a masking material, or for temporary protection of surfaces between polishing room and plating bath, Tygon Tempro-tec may be applied by brush, spray or by dipping. It air dries quickly, peels easily free, usually in a single piece. One gallon covers about 250 square feet of surface. Resists any plating solution, including hard or bright chromium. Clear or in colors.

If you plan to be in Chicago for the National Metal Congress, October 18-22, be sure to see the Tygon exhibit in Room 855, Palmer House.

U. S. STONEWARE

Since 1865 • *Akron, Ohio*

IN CANADA: CHAMBERLAIN ENGINEERING (CANADA) LTD., MONTREAL